THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. XCIV. No. 2248.] LONDON, JUNE 12, 1906. [58TH YEAR. PRICE 6d.

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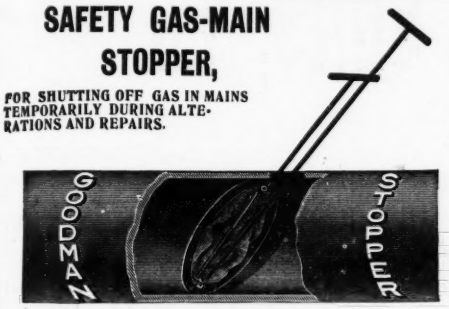

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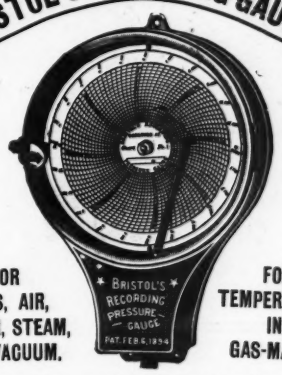

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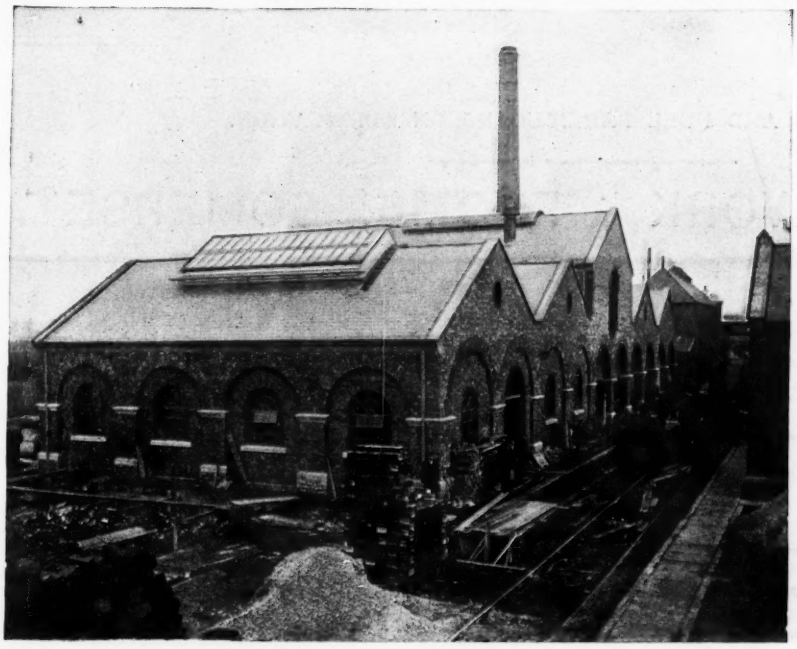

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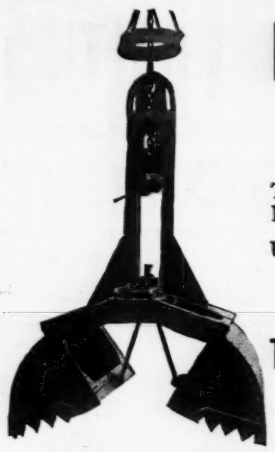

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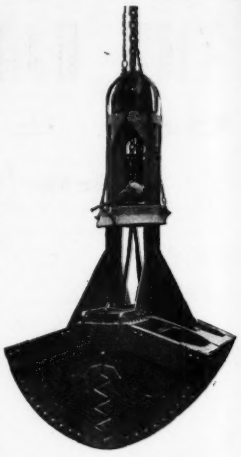

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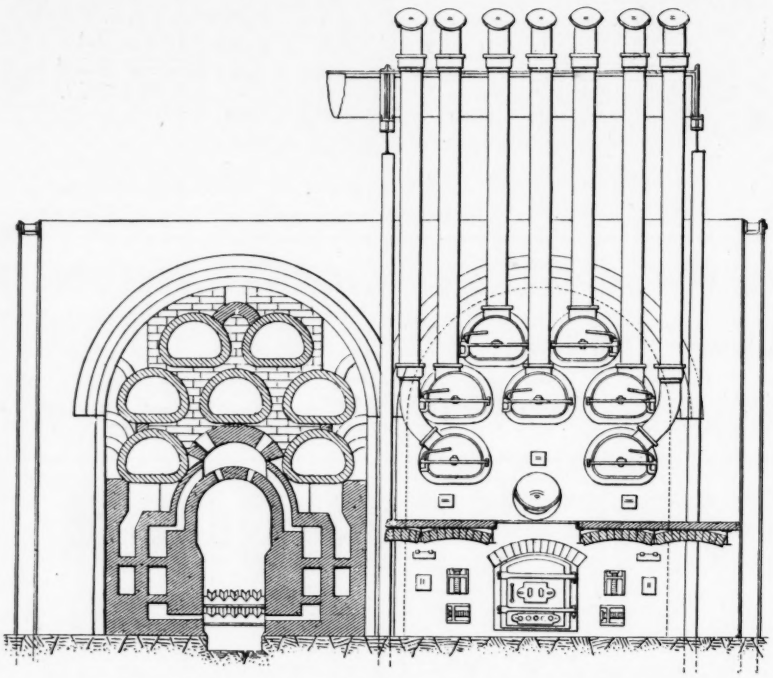

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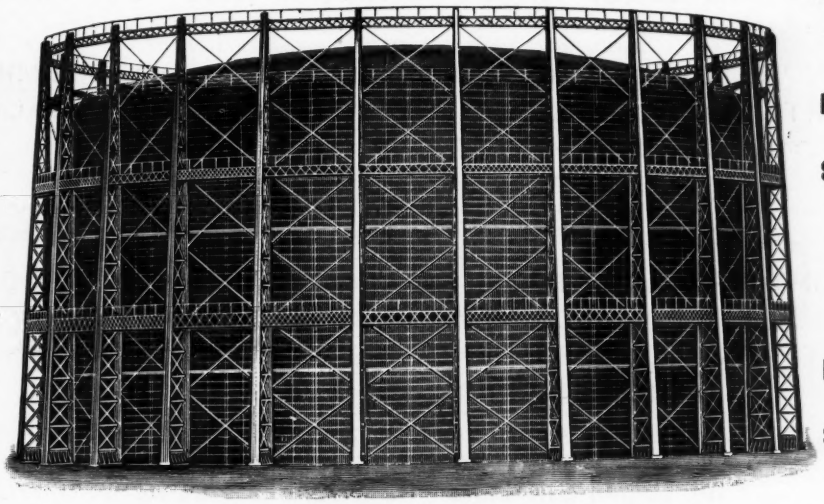

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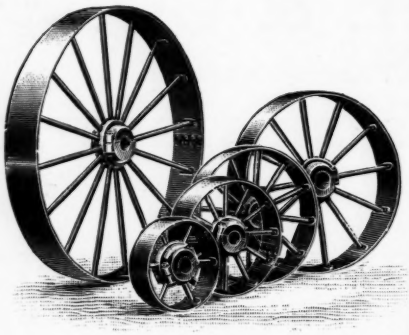

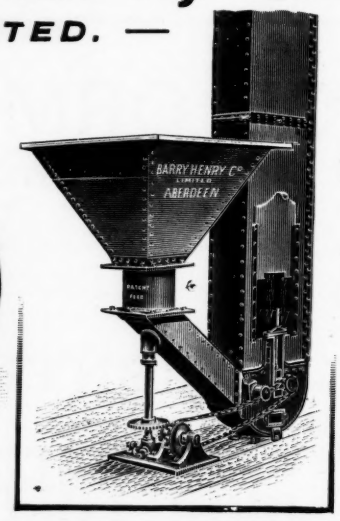

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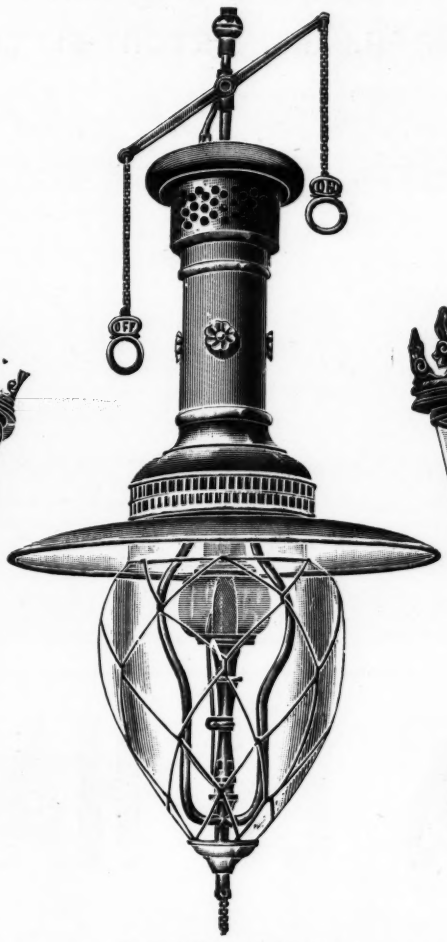

Fig. 607. 600 c.p.
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Fig. 35a. 300 c.p.
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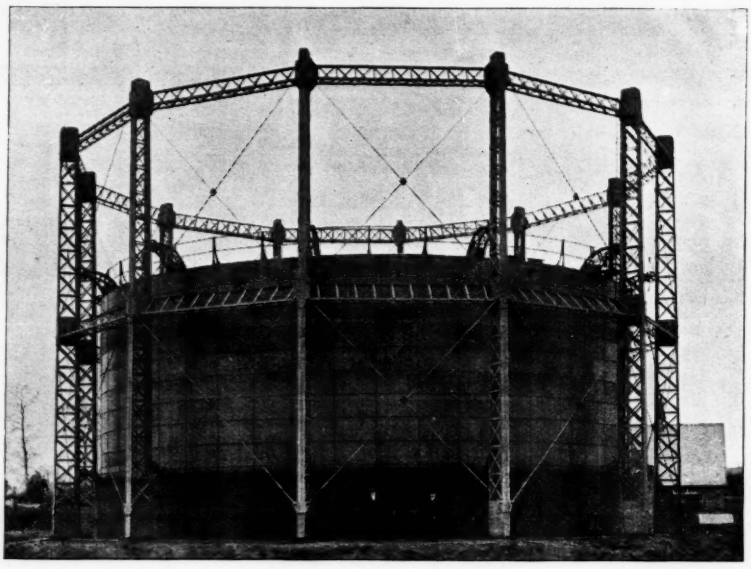

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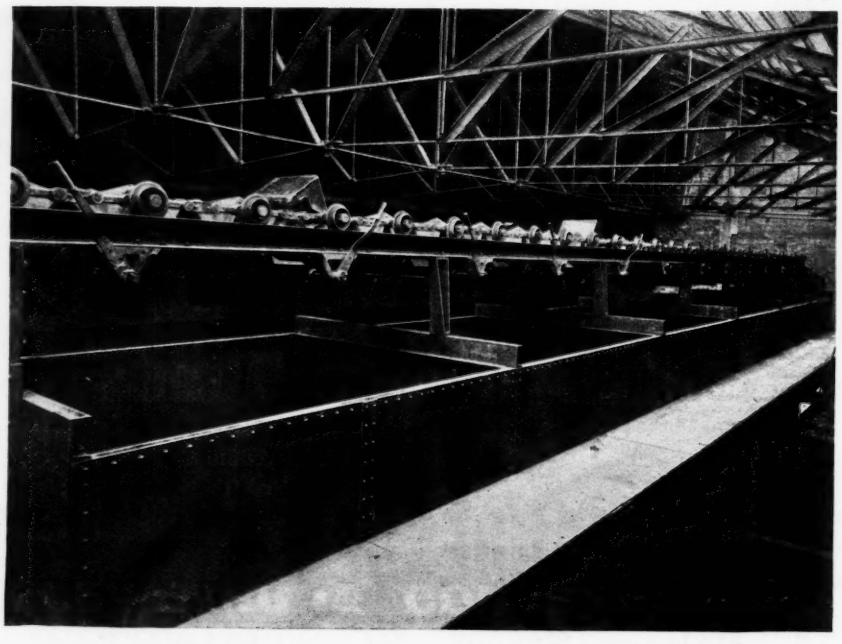

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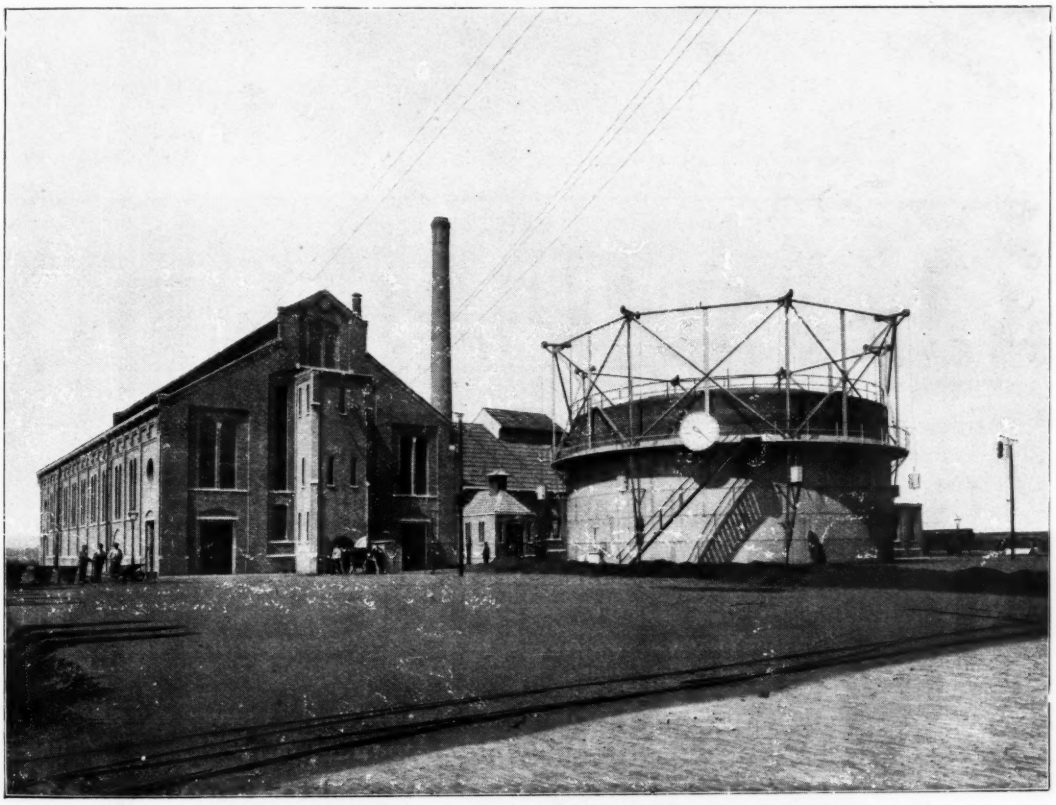

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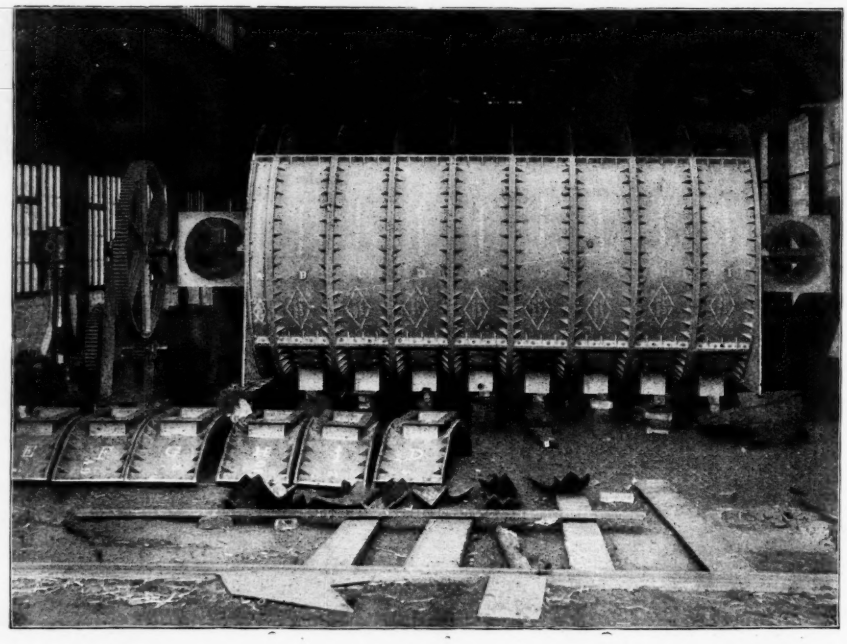

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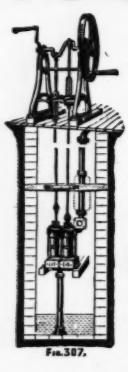

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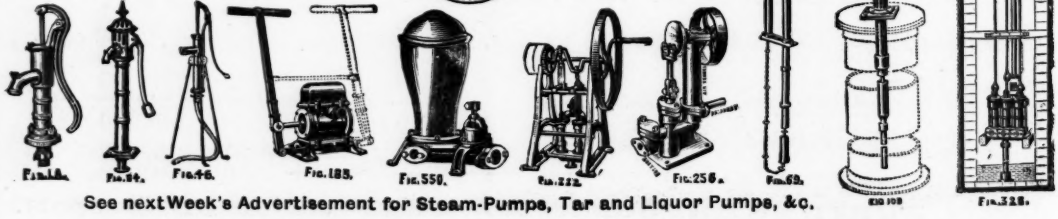

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"VERITAS" GAS MANTLES

Manufactured from Ramie fibre, many times stronger than the usual cotton base.

Do not shrink or buckle under the Bunsen flame, but retain their shape and offer the whole of their surface for the conversion of heat into light.

Maximum Illuminating Power maintained for about 500 hours. Average Life of Mantle, 1000 hours.

MADE IN THREE GRADES.

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For General Indoor Lighting.

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Recommended for Street Lighting.

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Tested to resist a pressure of 10 atmospheres. For High-Pressure and Self-Intensifying Burners.

"VERITAS" Mantles Officially tested at the Imperial Laboratory at Charlottenburg, gave the following results :—

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5 Hours	91·52
100 "	95·92
200 "	94·16
300 "	95·92
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Showing an increase in light of **30**% to **50**% over ordinary mantles.

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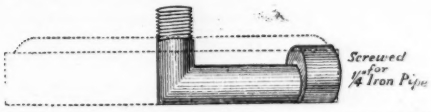

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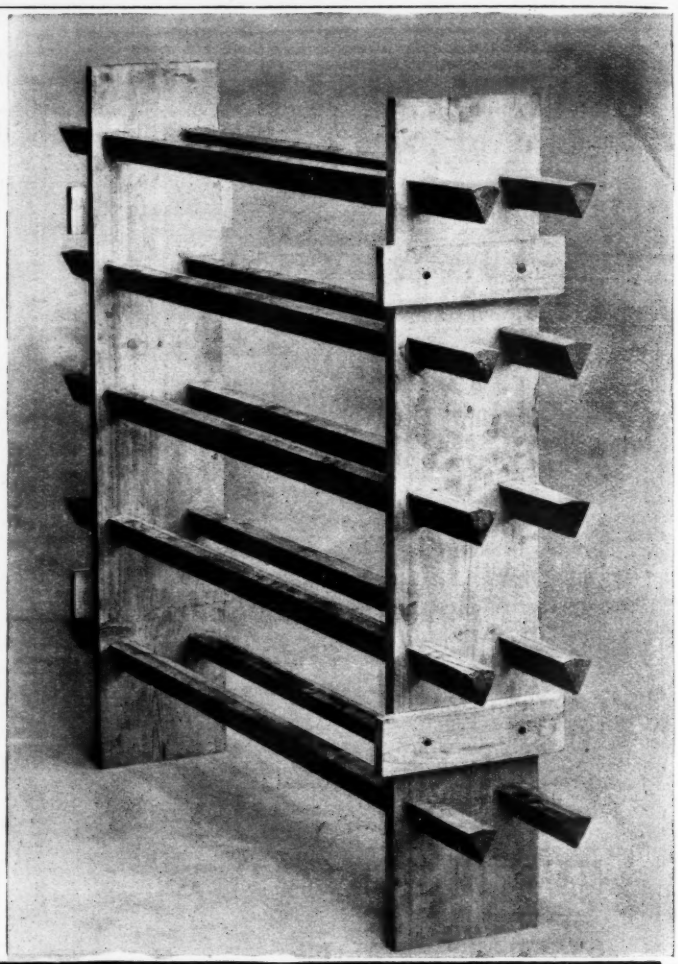

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Horizontal and Vertical alignment of bars, the upper surfaces of same being "ridge" topped, enabling maximum spacing and formation of supporting arches in the purifying material.

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NO FIRE DEVIL.
NO LEAD WASTED.
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For Jointing Gas and Water Pipes.

The presence of water will not hinder the work.

MUCH STRONGER
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Full Particulars may be obtained from the Sole Makers,
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As a Naphthalene Remover.

The Exhaust Steam heats up the Tar and the Gas, and enables it to remove the maximum amount of Naphthalene. By removing the Tar, no Naphthalene is carried forward to the Scrubbers, except in strong and thorough combination with an **EXCESS** of light hydrocarbons, so evenly distributed and always sufficient in quantity to prevent the action of ammonia on the phenols liberating the Naphthalene dissolved by them.

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CARBURETTED-WATER-GAS PLANT

— DOUBLE-SUPERHEATER SYSTEM. —

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Belfast	1,700,000	Geneva, Switz.	500,000	Rotterdam, Holland (Second)	1,500,000
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Bournemouth	1,000,000	Hamburg, Germany	1,750,000	Santiago de Cuba	400,000
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Bridlington (Second)	200,000	Hull	1,500,000	Southampton (Second)	500,000
Brighton	1,750,000	L. & N.W. Rly., Crewe	700,000	Southgate	400,000
Brighton (Second)	1,850,000	Lawrence, Mass.	400,000	Southport	750,000
Brussels—Forest	1,000,000	Lea Bridge	350,000	Southport (Second)	900,000
Brussels—Ville	750,000	Lea Bridge (Second)	350,000	Stafford	500,000
Brussels—Ville (Second)	750,000	Liége, Belgium	1,000,000	Staines	600,000
Brussels—Ville (Third)	1,500,000	Lincoln	500,000	Stockport	600,000
Carlisle	600,000	Liverpool	3,500,000	Stockport (Second)	600,000
Chorley	300,000	Liverpool (Second)	4,500,000	Stockton-on-Tees	500,000
Commercial Gas Co.	850,000	Longton	600,000	Swansea	750,000
Commercial (Second)	850,000	Magdeburg, Germany	1,400,000	Swansea (Second)	1,000,000
Commercial (Third)	1,250,000	Maidenhead	225,000	Sydney—Harbour	500,000
Commercial (Fourth)	2,000,000	Maidenhead (Second)	225,000	Sydney—Harbour (Second)	500,000
Copenhagen	700,000	Malta	400,000	Sydney—Mortlake	500,000
Copenhagen (Second)	2,500,000	Manchester	3,500,000	Sydney—Mortlake (Second)	500,000
Coventry	600,000	Manchester (Second)	3,500,000	Syracuse, N.Y.	850,000
Coventry (Second)	600,000	McKeesport, Pa.	500,000	Taunton	225,000
Croydon	1,250,000	Merthyr Tydfil	300,000	The Hague, Holland	1,000,000
Croydon (Second)	625,000	Middlesbrough	1,250,000	Tilburg, Holland	400,000
Croydon (Third)	625,000	Newburgh, N.Y.	350,000	Tottenham	750,000
Deventer, Holland	150,000	Newburgh (Second)	250,000	Tottenham (Second)	750,000
Deventer, Holland (Second)	200,000	New York	1,200,000	Tottenham (Third)	350,000
Dorking	150,000	New York	4,000,000	Tottenham (Fourth)	1,000,000
Dublin	2,000,000	North Middlesex	150,000	Tunbridge Wells	1,000,000
Dublin (Second)	2,000,000	North Middlesex (Second)	200,000	Utrecht, Holland	1,000,000
Dunedin, N.Z.	150,000	Norwich	1,000,000	Utrecht, Holland (Second)	1,000,000
Dunedin, N.Z. (Second)	275,000	Ostend, Belgium	100,000	Waltham	400,000
Durham	200,000	Perth, W.A.	125,000	Wandsworth & Putney	1,800,000
Eastbourne	1,250,000	Port Elizabeth, S.A.	400,000	Watford	300,000
Edinburgh	2,000,000	Portsmouth	1,000,000	Watford (Second)	350,000
Epsom	225,000	Posen, Germany	450,000	West Ham	1,500,000
Falmouth	150,000	Posen, Germany (Second)	700,000	Winchester	225,000
Faversham	200,000	Preston	1,400,000	Zwolle, Holland	200,000

AND WORK UNDERTAKEN SINCE JANUARY 1, 1904.

Taunton (2nd)	350,000	Flensburg, Sleswig	300,000	Agram, Croatia.	200,000
Bognor	100,000	Weston-super-Mare	300,000	Bruges, Belgium	200,000
Bournemouth (2nd)	500,000	Wexford, Ireland	100,000	Liége, Belgium (2nd)	750,000
Vienna	3,500,000	Budapest, Hungary	50,000	Lemberg, Galicia	260,000
Maastricht, Holland	200,000	Swindon.	300,000	Leeuwarden, Holland	400,000
Antwerp, Belgium (2nd)	1,000,000	Reading	1,000,000	Stockholm	1,500,000
Tottenham (5th)	1,000,000	Oberhausen, Germany	175,000	Romford (2nd)	350,000
The Hague, Holland (2nd)	500,000	Malmo, Sweden	350,000	Cracow, Galicia	200,000
Hampton Court.	500,000	Ipswich	750,000	Berlin-Rixdorf (2nd)	700,000
Lea Bridge (3rd)	400,000	Winchester (2nd)	125,000	Mayence	700,000
Dublin (3rd).	650,000	Zwolle, Holland (2nd)	200,000	Guildford (2nd)	200,000
North Middlesex (3rd)	75,000	Alkmaar, Holland	400,000	Kiel	1,000,000
St. Gallen, Switz. (2nd)	225,000	Leiden, Holland	500,000	Chigwell	350,000
Brussels—St. Josse	1,000,000	Poole	1,500,000	Rotterdam (4th)	750,000
Dundee	1,500,000	Berlin-Rixdorf	650,000	Haarlem, Holland	850,000
Bridgwater	200,000	Berlin-Charlottenburg	2,500,000	Weston-super-Mare (2nd)	350,000
West Ham (2nd)	800,000	Bochum, Westphalia	530,000	Wiesbaden	850,000
Brieg, Silesia	100,000	Brussels–Anderlecht	350,000	Augsberg	425,000
Brussels—Ville (4th)	350,000	Leigh, Lancs.	350,000	Budapest (2nd)	1,750,000
Innsbruck, Austria	200,000	Stockport (3rd).	400,000	Norwich (2nd)	300,000
Marlborough	100,000				

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VOL. XCIV., No. 2248.—TUESDAY, JUNE 12, 1906.

EDITORIAL NOTES—GAS, &c.

The Institution and Special Work.

As the time draws near for the annual gathering, interest in the proceedings of the Institution naturally increases. Comment was made last week upon the programme for the meeting and the annual report of the Council; reference being also made to a letter which has been addressed by the Council to the various gas undertakings of the United Kingdom, in pursuance of a report adopted at the last annual meeting, inviting contributions to a fund which is being established for defraying the expenses incidental to special work undertaken by the Institution from time to time. It is very properly pointed out in this letter that, although the subscriptions of the members are sufficient to meet the ordinary expenses of administration—these, it may be observed, being on a scale which can by no means be called extravagant, including as they do the cost of holding meetings and the publication of "Transactions" by which much valuable information and experience are disseminated—they do not provide the funds necessary for carrying out investigations likely to benefit the gas industry, or for adequately representing the latter when occasions arise for united action. Nor does it seem right that the members should bear the expense of work undertaken for the benefit of gas undertakings generally, to the owners of which it is but natural the Institution should look to supply the funds that may be required for such purposes.

This statement of the case proceeds, it will be seen, upon two assumptions—the one being that there is work to do for the advantage of the gas industry; and the other, that the Institution is a fit and proper body to be entrusted with it. Neither of these propositions can be at all seriously disputed. The present appeal, in fact, owes its origin to a suggestion made to the Council some time ago as to the desirability of an inquiry being instituted into the hygienic aspect of gas lighting, with a view to correcting certain popular notions with regard to it. The Council at once recognized the importance of the subject, but found themselves powerless for action owing to want of funds. In course of time, other subjects presented themselves; and the present letter contains a list of these, which, for comprehensiveness, might do credit to the zeal and activity of a new and reforming Parliament. It is, of course, to be understood that the Council do not for a moment entertain the idea of engaging all at once in the whole of the work indicated by such a list; for this could only result in congestion, or something worse. It is only intended to show the very wide range of subjects which the Council anticipate being called upon to investigate, if they are to properly and efficiently fulfil the *rôle* which is marked out for them by general consent. For it is not to be denied that, whether rightly or wrongly, much more is expected of them than the organization of meetings for the reading of papers, highly important though this undoubtedly is. They are expected to take cognizance of all matters affecting, or likely to affect, the gas industry as a whole, and take such action thereupon as may in the general interest seem to be advisable. Nor is this interpretation of their functions by any means a new one. It dates back from a time nearly twenty-five years ago, when a similar appeal was made by the then Gas Institute. This resulted in subscriptions from gas undertakings which amounted to about £170 per annum. Most unfortunately, the prospect was almost immediately afterwards clouded by dissensions which paralyzed the organization, and resulted in dividing the members into two Associations. This led to a considerable withdrawal of some special subscriptions; but to the present day there remains sufficient of them to form a good nucleus for the fresh start now determined upon, while there is, happily, the best guarantee for the future in the united front which the Institution now presents.

As to the great advantage to be derived from the existence of a properly qualified and representative body watchful over gas interests, there can be no question. An instance of this was afforded some years ago in connection with the inquiry instituted by a Departmental Committee of the Board of Trade on Standards of Light. Upon that Committee, which included the then Gas Referees, the three London Gas Companies were represented; Professor Lewes acting as Secretary. They recommended that, in lieu of candles, Dibdin's pentane air-flame argand burner should be employed for testing purposes—this, in their opinion, giving a practically unvarying illumination equal to that of ten standard candles. Doubts were soon expressed as to the accuracy of this conclusion; and the Council of the then Institution of Gas Engineers undertook to investigate the matter, with the result that the proposed standard was condemned as not being sufficiently reliable for the purpose. This led to a reconsideration of the question, and the adoption of the Harcourt standard lamp. It is interesting to note that almost the first work in which the newly constituted Institution found itself engaged had reference to a closely connected subject—namely, the proper rate of gas consumption to be observed with the "London" argand burner. That the action taken by the Council did much to strengthen the hands of the London Gas Companies in their opposition to the proposal to revert to the fixed rate of consumption, is fully admitted; and the Council very rightly call attention to the prominent share they took in the action which led to the satisfactory settlement of this vexed question. The other matter in which they have quite recently taken part, as mentioned in the letter—namely, the inquiry ordered by the Home Office into the objections lodged against the proposed Factory Act regulations for private sidings—is equally one as to which approval has been generally expressed.

The Council have consequently fairly solid reasons for seeking the support of gas undertakings generally. It is, however, to be presumed that the desirability—not to say the necessity—of taking the subscribers as much as possible into their confidence has not been overlooked by them. It cannot be advisable to fetter the Council by requiring them to keep the subscribers posted as to their intentions; but the fullest information should be given as to the disposal of any means that may be entrusted to them. Doubtless there will always be some to object to entrusting the Council with what is called a "roving commission;" but, speaking generally, the feeling will be one of confidence in their discretion and judgment. The announcement made by the Council of their intention to consider the desirability of amending the Gas-Works Clauses Act is highly satisfactory, whether or not the result be all that Mr. Townsend so greatly desires. But for this work the Council will need the services of an expert Parliamentary Agent, and the means wherewith to recompense him.

It is scarcely possible to treat of the subject of investigation and research without referring, however briefly, to the letter from Sir George Livesey which appeared in our last issue, with reference to the Perkin Memorial, since the objections raised by Sir George in this particular case apply by inference to any fund for investigation and research. We agree fully with a good deal of what Sir George says as to great inventions and discoveries having been stimulated by ambition or the hope of gain; nor is it possible not to admire the courage shown in resisting a popular movement in the belief of its unsoundness. But in his depreciation of the importance and value of the tar colour industry we must confess ourselves unable to follow him. There is, however, no need to discuss this subject. Our objection to the Chemical Society's Research Fund is that this is not likely to be under the control, either directly or indirectly, of the gas industry, and that it will in all probability be devoted to purposes connected with pure chemistry, in which the

practical gas man is but remotely interested. On the other hand, the fund asked for by the Institution of Gas Engineers is for definite and declared objects, which are of interest and importance to the gas industry at large; and for this reason alone it may be commended to the hearty support of all concerned.

Old Causes and Present Effects.

It is part of the tactics of the leaders of militant labour organizations to adroitly compound their messages to the labour world with all that is pleasant, and to discard everything unpalatable. Their dissertations recount the victories of the march (without any mention of the reverses) towards that millennium of labour when all shall receive the maximum amount of pay for the minimum amount of work, and when the men who provide the work and the capital shall be set in those humble niches appointed for them by the demagogues of anarchy and of socialism. It is a tactful method, for it works up enthusiasm and encouragement among those from whom is drawn financial support for the "cause." There is exemplification in the proceedings at the biennial conference last week of the National Union of Gas Workers and General Labourers. The proceedings are replete with suave pretence and covert truths, commencing with the preamble of the Presidential Address of Mr. Pete Curran. The conference being in Leeds raised recollections of the stirring times in the history of gas-works labour of the penultimate decade of the last century. Mr. Curran brought to memory the gas-workers' strike in that city in the year 1890. There is a picturesqueness about his style of doing this, and a grotesqueness about the absence of all reference to the various inglorious defeats which the Union had suffered during the years preceding. Said Mr. Curran: "Mr. Will Thorne, M.P., the General "Secretary of the Union, came to Leeds in 1890—on the "occasion of the gas-workers' strike—with what was prac-"tically the whole banking account of the Union, for the "purpose of fighting one of the most powerful Corporations "in the country. . . . It was due to Leeds more than "to any other city that the Union was so powerful and "influential to-day." Mr. Curran conveniently forgot to mention the Union's disasters in London, Manchester, and Salford; and when he glorifies the Leeds Corporation of the time with the description of "powerful," he is merely toying with the word to add a little showy splendour to the success that the Union on that occasion did obtain. The misrepresentation of the "powerfulness" of the Leeds Corporation of 1890 is proved by the facts that they were totally unprepared for a conflict; that they showed pitiful misjudgment as to the time at which to assert that they were masters of their own works; and that their capitulation is written in the history of the gas industry as one of the most feckless of its prominent incidents.

But while the President has triumphantly reminded us of Leeds, he ignores not only the losses that the subordination of diplomacy by truculency inflicted on the Union, but the effects of the activity of the Union in the eighties. There is really no necessity to refer to the great outstanding effect on the southern and eastern sides of London, which effect, while the delegates of the Gas Workers and General Labourers Union were assembled in Leeds congratulating themselves upon their petty doings, the Congress of Co-operative Societies in Birmingham were applauding as they had good reason to do. Mr. Thorne, at Leeds, alluded with satisfaction to the fact that the contributions of the members of the Union in the past two years amounted to £33,465; and that the balance of funds at the end of December was £6675. These figures are only remarkable for their smallness in comparison with the funds that the South Metropolitan gas workers alone have accumulated during the past sixteen years, just previous to which the Union had had a lesson of which Mr. Curran did not boast. The last issued half-year's accounts of the Company had an item "Co-partner-"ship, £18,000;" and Sir George Livesey stated at the half-yearly meeting that the employees had then something like £300,000 invested in stock, on deposit, or in their own houses. Financially, the South Metropolitan men are a tower of great strength compared with the Gas Workers and General Labourers Union; and there would be no occasion on our part to think twice—given the right of choice—over the question as to which of the two "Unions" we should prefer to be enrolled in.

That is only one effect of which the Union, through its militancy of the eighties, has been the cause. Another of Mr. Curran's utterances was that some men who ten years ago were skilled mechanics are to-day to be found at the docks and at the gates of the gas-works endeavouring to secure employment as casual general labourers. He cannot accuse the gas industry of assisting in this degeneracy. The trend in gas manufacture has been the reverse; and the Union has helped to make it so. Skilled mechanics, through the greater adoption of machinery instead of increasing manual labour, are in greater request in gas-works than they were of yore; and it is the Union that labour has to largely thank, through the tempestuous methods which they preferred to the more politic plans of the older established Unions, for accelerating the application of mechanical appliances to the production of coal gas. The Union, it is claimed, are the pioneers of the political education of the working class. The Union may also claim that, through their actions, they at one time actively prompted the pioneers of more economical methods in gas manufacture—in other words, helped to educate the administrators of the gas industry up to appreciate that a strong protective policy, in one form or another, was the best means by which they could avoid conflict brought about by the perennial discontent fomented by the New Unionism, officered by socialistic firebrands. Competition, of course, had also forced the application of those methods that produce economy in manufacture; but the wages accounts of gas undertakings show that—economy notwithstanding—the industry, owing to its success, is now a greater employer of labour than ever it was. Where mechanical application has produced per unit of gas production a lessening of manual labour, the cheapening of gas supply as a lighting agent and for other service has brought about an increase of business that has called for the employment of a greater number of hands. It is satisfactory to know this; but it cannot be satisfactory to those who in times past subscribed to the Union to know that the tactics of that body did much to assist in dispensing with hand labour in one direction in manufacture, and in giving strength to the gas industry, whereas its weakening would have been the irresistible result of the success of the factionists some fifteen to twenty years ago. There is this to be said, too, that the conditions of labour in the industry, through the progress of invention and not through the one-time industrious stirring up of strife by the Union, have been so largely mitigated that those in the service of the industry would think deeply before they would, at the bidding of the Union, put themselves among those skilled mechanics who are to-day knocking at the gates of gas-works endeavouring to secure employment as casual general labourers. Mr. Thorne reports that the total number of members in the Union at the end of December was only 28,120—a decrease of 3745, as compared with two years ago. What does this portend? A weakening of influence? Behind addresses of such triumphant note as that of Mr. Curran, are often hidden truths.

Nottingham Agitated.

There appears to be a great deal of unnecessary excitement at Nottingham over what is known as "The Gas Question." Difficulties there have been, and difficulties there are now; but they are traceable back, by the aid of the report which Sir George Livesey has made to the Corporation Gas Committee, to a tangle of circumstances which time only can completely unravel. The tangle is not of a day's production. It is the growth of years, and of changing conditions; and it is not to be disposed of by violent methods and impetuous acts. Time alone can completely right matters; and in Nottingham to-day there should be, instead of agitation over the policy of the Gas Committee and over the personal feelings of individual members of that body, gratification in the knowledge that Sir G. Livesey is able to report that the causes of the troubles are to be found in a number of relatively small difficulties and a mistake or two, and that these are all known to the Engineer and General Manager (Mr. J. H. Brown), and are "rapidly disappearing." There is no question about this being Sir George's deliberate view, because in another part of the report he gives the assurance that the causes of trouble are all being dealt with, and even ventures to prophesy that the time is not far distant when the supply of gas in Nottingham will be as satisfactory as it is in the great neighbouring towns.

The length of Sir George's report is not any gauge to the

importance of the causes of trouble with which he has had to deal. As a matter of fact, they are not now, after all that has been accomplished, of any great individual consequence, and the aggregate looks more imposing than it really is. The fact is that Mr. Brown, when he went to Nottingham, came in for an unenviable legacy; and no man could have worked harder than he has done in attacking what was in reality a serious situation. Sir George, in his own particular way, makes handsome acknowledgment of this in all parts of the report; and to-day there is no gas engineer in the whole country who is better qualified than Mr. Brown—with his technical qualifications and drilling at Nottingham in the past few years in that most effective of all seminaries, the school of adversity—to complete the work that he has so well begun. No man has infinite wisdom or sight; and in such a large concern as that at Nottingham, unless there is complete loyalty and trust on the part of every member of the executive and the official staff, the work of the chief officer may, in a measure, be rendered nugatory, or trouble may be produced of which the effects may be hard to remove. At yesterday's meeting of the City Council a Special Committee was appointed to investigate the whole troublous matter, with power to terminate the services of, or appoint, any official or officials. Perhaps the most useful course for the Committee to first pursue, would be inquire as to the actual causes that have led the Chairman (Mr. Councillor Harlow), Alderman Jelley, and Mr. Councillor Sands to resign their positions as members of the Gas Committee. If the constitution of the Committee is incompatible with an advancing policy which will complete the relief of the undertaking from trouble, then the sooner things are straightened out in this respect the better. As to the works, the distribution, and the relations with the consumers, with the endorsement that Sir George Livesey gives to what is being done, and to the necessity for continuing to persevere in these particular directions, it would be the height of imprudence to interfere other than by forwarding aid. In these directions, the difficulties have been, and are so far as they exist now, only complex through number; separately they are simple indeed. Therefore there is nothing remaining that is insurmountable; but there must be patience.

Municipal Lands and Works.

THE Pontypridd District Council must by now admit that they have made an egregious mistake regarding the use to which they may put land purchased under parliamentary powers for specific powers. Perhaps nearly as much expense has been incurred by them, after the manner of many improvident local authorities who have the run of the unlimited public purse, in convincing themselves of their error as would have been involved in its rectification at the outset, instead of after conviction had been brought home to them by the circuitous route of litigation. They have to pay dearly for having the truth enforced that there cannot be disobedience, even on the part of a District Council, to the definitive powers conferred by a Provisional Order or an Act of Parliament; but they have in all probability by their act and defence of that act, and by an appeal against an injunction granted by Mr. Justice Farwell, done good service in preventing other authorities from taking a too liberal view of the uses to which they may put land purchased under parliamentary authorization for a prescribed use.

The matter has lately been argued before the Master of the Rolls and Lords Justices Romer and Cozens-Hardy on an appeal by the District Council from the injunction granted by Mr. Justice Farwell in the summer of last year. There was an editorial comment on the case in the "JOURNAL" for Sept. 5 last; but the facts may be here briefly re-stated. Though they have reference to land which the Council were empowered to use for an electricity generating-station, and to the wrongful erection of a refuse destructor on that land, the authorized purpose and the unauthorized utilization might have equal application to any other subjects. Under the Council's Electric Lighting Provisional Order of 1901, the Council purchased from the Trustees of the Llanover Estates some 1½ acres of land for the express purpose of a generating-station; but it was not disclosed to the Trustees that the erection of a refuse destructor was contemplated, or that there was anything of the kind in prospect. There is abundant evidence that the combination of a destructor with the electricity station was not part of the original scheme, because the Council afterwards thought of obtaining the sanction of the Local Government Board to the construction of the destructor on the site. That sanction was beyond the power of the Board to give; but they suggested a little stratagem which it was thought would circumvent the objectors, and enable the Council to overcome any little difficulty. That was through the by-way of a bogus sale of the portion of the land required, and its repurchase designedly for the refuse destructor. This curious little scheme was so palpably a trick to achieve evasion that it very properly has not been allowed to work. See what it would amount to if such a trick could succeed! No landowner would be safe in selling a portion of his property for objects that would not militate against the value of the remainder; and it would be quite easy, too, for land to be acquired for a use that would not interfere with the amenities of a district, and then be put to some disagreeable purpose—if the change could be effected with such ease.

The Trustees of the Llanover Estates did not look with favour upon having a refuse destructor for a neighbour; and consequently as the Council persisted in their unreasonable use of the land for a purpose distinct from that for which it was purchased, the Trustees applied for an injunction to restrain them. This, as stated last September, Mr. Justice Farwell granted; and the Court of Appeal have now very properly confirmed the injunction. It is held that, in purchasing the land, the Council were acting under the General Electric Lighting Acts and their Provisional Order; and these statutory powers only refer to electricity generation and supply. It was argued in the Appeal Court that, as the heat obtained from the destruction of the refuse was to be utilized in the raising of steam, which in turn would be employed in the generation of electricity, the destructor formed part of the electricity plant. The inference was clever, but not effective. If the Council were, by their Order or the General Acts, given the right to erect a destructor on the land in question, it could only be by virtue of the destructor being "necessary and incidental" to the supply of electricity. If it is not necessary or incidental to this object, then its construction is *ultra vires* of the statutory powers. It cannot, by any amount of twisting, be held that a destructor is necessary or incidental to the supply of electricity. The primary purpose of a destructor is for the disposal of refuse, not for the production of electricity. So spoke the Court of Appeal; and the Pontypridd District Council must by this time be persuaded that they have been ill-advised over this matter. Although they have almost plenary powers in respect of the spending of the money drawn from the ratepayers, there are acts that are governed by the law; and one is the wrongful utilization of land bought under parliamentary powers for a specific purpose. While we sympathize with the ratepayers of the town, the lesson is a valuable one.

Proposed Illuminating Engineering Society for England.

Our readers are aware that a Society has lately been formed in New York for dealing with questions relating specially to illumination; and it may be remembered that in the "JOURNAL" for the 20th of March last we offered a few observations on the scheme. It was then recognized that the idea of working up the art of illumination was an excellent one, and one which it was suggested might profitably engage the attention of the Institution of Gas Engineers, with, of course, special reference to the use of gas. We pointed out that outdoor and interior lighting are both susceptible of improvement—the latter chiefly from the hygienic standpoint—and remarked that a great deal might be done by "the enunciation of correct and economic principles in regard to the distribution of light." We gave a list of the papers to come before the new Society, and heartily wished it success. It will be seen, from a communication which appears elsewhere, that a movement is on foot for the formation in this country of a Society corresponding to the one in respect of which our remarks were made. The initiative has been taken by Mr. Leon Gaster, of No. 32, Victoria Street, Westminster, who has set forth his views in an article in the "Electrical Magazine," the principal portions of which are given at the end of his letter. Mr. Gaster, who is a Consulting Electrical Engineer, acknowledges that by looking after the lighting business gas engineers have made illumination by gas what it is; but, with us, he thinks there is

still more to be done in this direction. He does not anticipate that any antagonistic feeling would be created between different illuminating engineers by the formation of the proposed Society. On the contrary, he thinks that each would endeavour to bring apparently conflicting interests closer together, by the exchange of views on the relative merits of the various illuminants. He considers that a Society such as the one proposed should receive the hearty support of the Councils of the gas and electric professional organizations and of the newly-formed British Science Guild. We are pleased to direct our readers' attention to Mr. Gaster's proposal, and shall be glad to know their views thereon.

An Echo of a Coal Strike.

After having been before the Courts for more than two years, the litigation arising out of the notorious strike at the Denaby and Cadeby Collieries has at length run its course; the Yorkshire Miners' Association having been successful in the House of Lords (as they were in the Court of Appeal, though not when the case was before a Judge and Jury) in resisting a claim by the Colliery Company for damages for conspiracy to injure the plaintiffs by bringing about a strike among their workmen involving the breaking of their contracts of service, and also for conspiring to maintain the strike by intimidation, molestation, and the illegal payment of strike money. Apart from considerations of principle, the case was an important one to both sides, as may be judged from the fact that the Association had to pay into a bank the sum £75,000 as a condition of obtaining stay of execution pending the hearing of the case by the Court of Appeal. The Association have some 150 branches, including one each at Denaby and Cadeby, which were responsible for the bringing about of a cessation of work which was admittedly illegal, as it involved the breaking of the miners' contracts; and it was argued for the Colliery Company that the branches were acting as agents of the Association. This view, however, was not accepted by the House of Lords; the Lord Chancellor remarking that the members of each individual branch had a right to strike which they derived from the general law. The Association, he added, did not confer this right. They restricted it by rules requiring a prescribed majority as the indispensable preliminary; but he did not see how either the officials or the committees thereby became agents of the Association to procure a strike, even if it were lawful and regular—still less to procure one if contrary to the rules and contrary to the law, in breach of existing contracts. As to the second claim, the payment of the strike money was admittedly illegal, as one member of the Association succeeded in getting an injunction to restrain the distribution of further money (which, it may incidentally be mentioned, promptly put an end to the strike). The Lord Chancellor, however, said he failed to see how the fact that the rules were contravened could confer upon the plaintiffs any ground of action which otherwise they would not have possessed. The wrong committed by the Central Council of the Association was against its own members in dissipating their funds, and not against the employers, who had no interest in the funds. Had the rules permitted it, the grant of strike pay would have given the plaintiffs no cause of action; and he remarked that it seemed a novel argument that they should acquire a right of action from the fact that the money so paid was derived by breach of trust from the funds of the Association they sued. If, he added, they were to hold that those who maintained the strike, by helping with money the men and their families, were liable in damages merely because it caused loss to the employers, they would in effect be saying that every strike was an actionable wrong. Their Lordships also found that no acts of molestation had been brought home to the Association. It was pointed out by Lord James of Hereford, in the course of his judgment, that before any strike pay was voted, the contracts of service between the employers and workmen had terminated; the men having been absent from their work for a fortnight. The result, therefore, to the plaintiffs of what must have been a enormously expensive action is that the two officials of the branches are the only persons found liable for what happened—they having allowed judgment to go against them by default; and this is likely to be but a barren victory. So far as the Miners' Association are concerned, the judgment is eminently satisfactory to them; for besides the heavy sum involved in the litigation, it must be a relief to find themselves so largely freed of responsibility for the actions of the branches.

Some Corporation Results.

The results of the working of municipal gas undertakings during the past financial year, which are just now occupying a considerable portion of our news columns, show the gratifying progress which it is usually the pleasure of those who have control of them to be able to report. During the past two or three weeks, many excellent records have been published; and to-day there are several more of an equally satisfactory character. In the past year reductions in price came into effect in a large number of places; and in others concessions have been decided upon for the current twelve months. Altogether there seems to be ample evidence that local authorities generally are as fully alive as companies to the competition that has to be successfully grappled with if their gas undertakings are to continue in the path of prosperity to which they have become so well accustomed. There is a widespread determination to fight suction gas tooth and nail by the most effective means at disposal—the offer of liberal terms to power users—and next year's reports should furnish some decided indication as to how far this policy is likely to be successful. The Chairman of the West Bromwich Gas Committee admits that his undertaking "has been hit very hard during the last year or two by the new system of suction gas;" but it is hoped that the low scale of charges now agreed upon will put an end to this inroad. At St. Helens, the past year has been a very successful one; the quantity of gas made constituting a record. An outstanding feature here is the fact that the income from bye-products, when deducted from the total manufacturing costs, leaves the Corporation with a cost price of 4·7d. for 18-candle gas into the holder. The coal bill was more than paid for by the return from residuals, which is a repetition of Mr. Glover's achievement in the same direction for the past eight years—with the exception of 1901, when the cost of coal was abnormally high. At Nantwich, much satisfaction is felt at the results of the working for the first complete year during which the undertaking has been in the hands of the Urban District Council. Instead of there being a deficiency of about £700 per annum, the possibility of having to face which had, it seems, been contemplated by the Council, a surplus has been realized upon the eighteen months' working of over £1500. The sale of gas shows a very satisfactory increase; and a determined effort is to be made here also to meet the competition of suction gas, by means of a substantial reduction in price to all motive-power users.

Public Lighting Committees.

The question has been raised at Colchester as to whether the public lighting of a town—the local authority being the owners of an electric light undertaking—ought to be under the control of the Electric Lighting Committee or an independent Committee. To our mind, there being two rival methods of public lighting, there is only one sane answer to the question; but apparently the Corporation Electrical Engineer and at least one of our electrical contemporaries are seriously of a contrary opinion. The matter has arisen in this way: The Lighting Committee of the Corporation have recommended—and we take it not without sound reason—a certain expenditure on extending incandescent gas lighting in the streets. In the thoroughfares concerned, there are electric lighting mains; and, as a matter of fact, the Electric Lighting Department appear to be the unhappy possessors of 13 miles of electricity distributing cables which (can it really be through want of public appreciation of electric lighting?) are said to be of no use except for street lighting. That they have got dead capital represented by these unproductive cables is not a sufficient reason why they should make them productive at an expense greater to the ratepayers than it is found necessary to incur for the efficient lighting of the streets by incandescent gas lighting. The Electrical Engineer has protested against the action of the Public Lighting Committee, which seems to be rather a presumptuous thing for an official to do; and the electrical contemporary referred to hopes that the outcome will be to place the street lighting in charge of the Electricity Committee—the arrangement of having an Electricity Committee and a Public Lighting Committee being described as "unbusinesslike." That is a matter of opinion; the incident itself—which shows the independence of the latter Committee—being the proof that, though the electricity undertaking belongs to the town, the interests of the general body of ratepayers are the Committee's first

consideration. They have had experience of both electric and incandescent gas lighting; and they are in the position of buyers and not sellers. Seeing that both gas and electricity is employed for street lighting, the interests of the ratepayers can only be safeguarded by, as far as possible, the independence of administration. Such independence enables the Committee to have an open mind; and they are more approachable by a competing system of lighting than would be the Electricity Committee. With the public lighting in the hands of the latter, the interests of the ratepayers would be pushed on one side in favour of those of the electricity undertaking. Supposing a town in which both the electricity and the gas undertakings were in the hands of the local authority, would it then be fair, to place the public lighting in the hands of the electricity committee? If not, why at Colchester, because it happens that the gas supply, which contributes largely to the rates of the town, is in the hands of a Company? From every point of view, then, justice and a liberal respect for the interests of the ratepayers demand a free hand in dealing with the public lighting.

Critical Councillors at Wigan.

On more than one occasion during the past few years, the Wigan Borough Council have "distinguished" themselves by a discussion upon the advisability of permitting the officials to attend Association meetings; and it really seems as though their tendency in this direction—or rather that of a minority of the members—is incurable. At any rate, the matter has cropped up again this year in connection with the Gas Committee's authorization to their Engineer to represent the Corporation at the forthcoming annual meeting of the Institution of Gas Engineers. One would think that gas supplying authorities would be only too pleased for their technical officers to attend such gatherings. Most of them are, of course; but certain of the Wigan Councillors see the question in a different light. It must be admitted that they have not very many, or very forcible, arguments with which to support their objection to the custom of sending officials to the meetings of organizations like the Institution of Gas Engineers and the Association of Municipal Corporations. In fact, judging from the remarks made on the present occasion, there appears to be a haunting fear in the minds of the Councillors concerned lest the Engineer may by some chance enjoy himself on his visit to London. The old opinion was trotted out that such gatherings are nothing more nor less than a "picnic;" but both the Councillors who made use of the word at Wigan last week were very properly compelled by the Mayor to withdraw it before he would allow them to proceed with their speeches. Nothing daunted by this rebuff, however, other equally amusing reasons for their attitude were adduced by the objectors. The first remarked that the argument had been used that the Trade Unions sent their representatives to conferences and paid them for going; and it could be argued that the ratepayers of Wigan were sending their Gas Engineer in the present instance, and that the ratepayers should pay. But he held that the Union to which the Gas Engineer belonged ought to pay for his going down to such conferences as a representative of his Union; for it was because of the strength of their Unionism that they were able to get such splendid salaries as were being paid in the towns throughout the country. What marvellous perspicacity, to be sure. The explanation as to how "splendid salaries" are secured will no doubt be noted with particular interest by some of the correspondents whose letters have recently appeared in the columns of the "JOURNAL." Such a brilliant piece of reasoning as this it was hard indeed for the next speaker to beat; but he did his little best. If, he said, it was argued that the Gas Engineer, in going to London, would receive information which would be for the benefit of the whole community, his reply would be that, in the event of the Gas Engineer removing himself say in six months' time to another place, then whatever benefit he gained would be a loss to Wigan, and a gain to the place he went to. He also pointed out that these meetings generally took place in the summer time, when the weather was good—adding, "You don't find them going in the winter, when it is foggy, and blowing, and snowing." This Town Councillor evidently would prefer that gas engineers should spend a week away from their works just at the busiest time of the year, when the demand for gas was at its maximum. It is really difficult to treat seriously such assertions as these; but as an aspect of municipal government they may not, unfortunately, be ignored. We cannot help wondering how this debate of the Wigan Borough Council would strike the Commissioners of the National Civic Federation of the United States, who are at present busy inquiring into the methods and results of municipal and private enterprise in this country.

The Question of Miners' Wages.

The miners in the federated districts of England and North Wales have been less fortunate than their fellow workers in South Wales with respect to their demand for an increase in wages. There has been a general movement among the men throughout the country to secure a better rate of remuneration, on the ground that the volume of trade and selling prices have recently shown an improvement that would fully warrant such a course. It will be remembered that when the demand of the South Wales miners came before their Conciliation Board, an agreement was arrived at whereby they were granted an advance of 2½ per cent. as from June 1, instead of the 3¾ per cent. for which they originally applied. The English and North Wales miners asked for an advance of 5 per cent. on the existing rate; and the matter came before the Conciliation Board recently, after having been informally introduced at a meeting of the Board towards the end of March. On the earlier occasion, the owners refused to concede any advance, on the ground that, though the volume of trade had improved, selling prices did not warrant any alteration in the present rate of pay. Since then the figures for the first quarter of the year have been made up; and they were fully discussed at the last meeting—the owners firmly holding to their contention that they were not such as would justify any advance in wages. There the matter will remain until trade shows greater expansion, unless meanwhile the men decide to further press their demand. The case of the Scottish miners was settled last week; and they also have, to their great disappointment, been refused the advance of 12½ per cent. in wages for which they had made application to their Conciliation Board—it having been found upon investigation that trade was not improving, so as to justify a higher rate of pay.

PERSONAL.

MR. G. KEILLOR, of Musselburgh, has been appointed Manager of the Comrie Gas Company, in succession to Mr. A. Lobban, transferred to Auchterarder.

At the annual meeting the Redhill Gas-Works Football Club, which last season (the first of its formation) carried off the cup in the second division of the Redhill and District League, the members took the opportunity offered by the presence of the President of the Club—Mr. JAMES PATERSON, the Engineer and Secretary of the Redhill Gas Company—to present him with a case of silver spoons and a pair of silver candlesticks, on behalf of the engineering staff and workmen of the Company, as a token of respect and esteem on the approach of his marriage, which will take place on Thursday next.

Mr. W. A. M. VALON, who has been appointed Assistant-Engineer to the South Shields Gas Company, under Mr. T. H. Duxbery, is the third son of Mr. W. A. M'Intosh Valon, and was articled to Mr. J. W. Morrison, the Chief Engineer of the Sheffield Gas Company, after having some experience of the Ramsgate Gas and Water Works. While at Sheffield with Mr. Morrison, after the expiration of his articles, he was entrusted with the supervision of the erection of the new gasholder and tank which have been recently completed there, as well as other works of extension going on about the same time. As considerable extension is in contemplation at South Shields, his special experience at Sheffield should stand him in good stead.

Water Gas in Paris.—The feature of special interest in the programme for the forthcoming annual congress of the Société Technique du Gaz en France, some particulars in regard to which are given elsewhere, will be the paper by M. Steger on the Kramers and Aarts system for the production of water gas; and, probably with the view of preparing the members for the reception of the paper, an account of the system has been given by the French Technical Press. The matter is just now of considerable moment to Parisians; for in the scheme which the Prefect of the Seine has laid before the Municipal Council for the control of the gas supply of the city as from the end of the present year, by means of a concession in which the City will participate financially, it is provided that gas produced from heavy oils or enriched or unenriched water gas may be admixed with ordinary coal gas for distribution, but only in such proportion that the carbonic oxide contained therein shall never exceed 25 per cent. by volume.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 731.)

THE Stock Exchange was slow last week in making a recovery from the interlude of Whitsuntide. It reopened on Tuesday in a listless mood; and the small attendance of members militated against a revival. Still the general tone was pretty cheerful, and prices bore up well against the calm. This was maintained for a day or two more; and among the markets which kept firm were Home Rails, aided by fine weather traffic, and the American. But dullness gradually crept on, and the extreme quietude was depressing. South Africans were a prey to uncertainty as to the Government action; and monetary factors overruled the gilt-edged division. In the Money Market, there was an abundant supply in excess of all requirements, and rates for short loans were light. Discount rates also, though steady at first, had eventually to give way. In the Gas Market, business in the aggregate furnished a fairly good array of transactions; but they were not well distributed, and two of the biggest issues monopolized the greater share of them. The general conditions were unchanged, and very few quotations underwent any alteration at all. In Gaslight and Coke issues, the ordinary was fairly active in the earlier portion of the week; but it fell quiet as the time went on. Nevertheless it was very steady; and the prices marked never ranged outside 97¼ to 98. The selling price, however, was a shade easier. The secured issues were not active, but were firm. The maximum changed hands at 88 and 88¼; and the preference at 109 and 110 (with a rise of 1 in the quotation). The debenture was not dealt in. South Metropolitan was firm and quiet; and transactions were marked at 128 and 129. Commercials showed no increase in activity. There was one deal marked in the 4 per cent., at 115; and a couple in the 3½ per cent., at 110 and 110¾. The Suburban and Provincial group were hardly touched. Brentford new was marked at 203⅓; and a small amount of British was done at 42 free. Southampton quotation was advanced a couple of points; but on the local Exchange, Newcastle was set back a point from the very high figures to which it had been worked up. In the Continental Companies, Imperial was again very active—easily topping the list in the number of transactions marked, and was steady. The prices at which it changed hands ranged from 177½ to 178¾, with one small parcel done free at 177¼. European fully-paid was done at 24¾; and Union was not dealt in. Among the undertakings of the remoter world, Buenos Ayres changed hands at 12¼ and 12½, ditto debenture at 97 and 98½, Primitiva ordinary at 6½ and 6¾, ditto preference at 5¼, River Plate at from 12½ to 12¾, Cape Town at 16, and Oriental at 148.

The closing prices are shown in our Stock and Share List on page 731.

ELECTRIC LIGHTING MEMORANDA.

High-Pressure Gas or Flame Arcs for Parliament Street and Whitehall—Comparative Prices for Installation and Lighting and Maintenance—The Truth from Hastings.

THERE are two or three points in the report published in last week's issue on the subject of the lighting of Parliament Street and Whitehall by high-pressure gas-lamps and electric flame arc lamps, which should be emphasized. In the first place, it will come as a terrible shock to electricians who have been in the habit of citing the delusive per-candle-power-per-annum costs of the City Engineer of Westminster (Mr. Bradley) to learn that the Works Committee have recommended the City Council to accept the tender of the Gaslight and Coke Company for high-pressure lighting in opposition to that submitted by the Westminster Electric Supply Corporation for flame arc lamps—the hope of the electrical industry. We commend the figures quoted in the report to the consideration of the ratepayers of those towns—such as Hastings—where the Electric Lighting Committees, panic stricken, are quoting prices for these flame arc lamps that cannot pay, in order to save them the confession that the cheaper and more efficient system of public lighting is that offered by the local gas suppliers. It must be remembered when considering the figures tendered for Parliament Street and Whitehall that, being the main avenue from the West-end to the Houses of Parliament and the Government Offices, it is one of the choicest positions in London for lighting; and therefore the Westminster Electric Supply Corporation are hardly likely to neglect any effort to displant gas lighting there. The Gas Company propose to supply lamp columns and high-pressure 900-candle power lamps where none now exist at £17 per lamp; but the Electric Corporation's tender for the supply of 9 ampere Oriflamme arc lamps and the necessary columns is £42 10s. per lamp. Those are the comparative installation prices.

The Gas Company's tender for maintenance and lighting for the 900-candle power gas-lamps is £15 1s. each per annum. The Electric Corporation submit alternative tenders—the one proposing that they bear the capital charges, the posts and lamps remaining their property; and the second, that the City Council pay the £42 10s. per lamp for installation, and a fixed price for lighting and maintenance. There is a peculiarity about these tenders which is also worthy of note. It is that for eighteen months the Electric Corporation propose to supply and maintain the lamps free, "because the system of lighting by flame arc lamps is new, and they wish to gain practical experience of the best type of lamp." This is additional evidence to that already accumulated that among electrical engineers doubt lingers as to the reliability of these lamps. The Electric Corporation are perfectly sincere about this free lighting for eighteen months, as a study of the figures show. After the eighteen months, if the Electric Corporation supply the columns and the lamps, the charge will be £22 per lamp per annum, less discounts ascending from 3 to 4½ per cent., for the remaining three-and-a-half years of the contract. If the eighteen months are included, the annual price would average £14 16s. 10d. for the five years; but if the contract is extended to ten years, the price of £22 (less discount) still continuing, the average annual price, including the free eighteen months, would rise to £17 15s. 9d. Taking the second tender, the City Council paying £42 10s. per lamp for installation, the annual charge for lighting and maintenance would be £17 15s. per lamp; or, averaging the cost over the five years, including the eighteen months free lighting, the average would be £11 19s. 5d. But again, if the contract were extended to ten years, the £17 15s. per annum would be continued; and, including the year and a half of free lighting, the average charge would be £15 3s. 6d., upon which the capital charges attaching to the high installation cost of £42 10s. per lamp would have to be placed, as well as depreciation. The Electric Corporation urge that, though nominally the illuminating power of their lamps is 900 candles, in reality it will be 1200 candles; but experience elsewhere has shown that the candle power of these lamps is a very fluctuating quantity.

Now if these figures are the best that the Westminster Electric Supply Corporation can offer, to capture this splendid situation for lighting from the Gas Company, how is it that for similar lamps such low quotations have been made elsewhere by hard-pressed Electric Lighting Committees? Hastings is a case in point; and explanation follows. The gratuitous newspaper quotations at the time that the City Corporation, sickened beyond measure of electric lighting, gave renewed attention, and in a very practical way, to high-pressure and ordinary incandescent gas lighting, also come to mind. It will be observed that the recommendation of the Works Committee of the Westminster City Council was only made "after a careful consideration of the tenders;" and therefore, although the report and recommendation have been referred back to the Committee, it is well to impress the importance of the figures. It will be observed, too, that the tender for electricity, though the contract is of long duration, does not hold out any prospect of any reduction in price. The same may be said of the tender for gas; but taking all costs into consideration, gas leads in the lowness of expense per lamp. The Electric Corporation introduce some economy by suggesting the use of 15 flame arc lamps; or five less than the Gas Company think desirable for efficiently lighting the thoroughfare. The importance of Parliament Street and Whitehall is such that it would be a pity to spoil the lighting by cutting down too finely the centres of illumination; and a more equable distribution of light must be obtained from twenty centres than from fifteen.

The truth is out at Hastings about those wonderful Oriflamme lamps, which have been said (we had better repeat at Hastings, as electrical engineers elsewhere might object) to have an illuminating power of 2000 candles, and can be supplied by the Electric Lighting Department at £10 per lamp, as against nearly £50 for the old arc lamps in the town. We fancy the Oriflamme lamps proposed are similar to those that the Westminster Electric Corporation state have a nominal illuminating power of 900 candles, and believe will give 1200 candles. But as illuminating power is not a constant quantity with arc lamps, it cannot be expected that such a respectable body as the Electric Supply Corporation would care to be tied to a few hundred candles more or less per lamp. But the point is that the Hastings ratepayers have been deceived over the price of these Oriflamme lamps. They have been led to understand that the price of £10 (some time ago a scheme was before the Council in which £20 was mentioned as a fair price for these lamps) was a paying one; the figures from Westminster show something altogether different. It was suggested in the "Memoranda" for April 17 that either the £10 was a sporting offer, or the Electric Lighting Committee had been robbing the ratepayers in taking from them nearly £50 per lamp for the old arc lighting. In the "Hastings Observer" for April 28, there was a report of an interview with an electrical gentleman, who preferred to let his "light" shine through the Editor, so that he should remain unknown, and who was apparently one of the advocates of electric lighting who had had "his ire" roused by "the indictment of electric lighting by the friends of gas." That gentleman denied our assertion that this was a "sporting offer." We do not know whether the person interviewed was Mr. R. F. Ferguson, the Borough Electrical Engineer; but this gentleman has just been before Mr. H. R. Hooper, M.Inst.C.E., one of the Inspectors of the Local Government Board, in connection with an application to borrow £563 for the extension of electric lighting by these flame arc lamps. Mr. Hooper has patience and acumen in investigating these electric lighting questions; and he pressed Mr. Ferguson to explain how it was that for electric arcs the ratepayers are paying the highest price in the country, and now for these Oriflamme lamps the Electricity Department are proposing about the lowest price—going from one extreme to the other.

Mr. Ferguson shied at the question. By dint of a little persuasion, however, the Inspector drew from him what we have all along suspected, that the £10 is a sporting offer, and that it only covers the electricity generating charge.

Now why could not someone have owned up to this at first, instead of beating about the bush and pretending—obviously for no other purpose than to mislead the ratepayers—that there was something in these lamps that enabled the Committee to make such a low offer. That £10 covering only the electricity generating costs is not what the lamps will cost if the Local Government Board permit the borrowing of this sum for their installation (which we now very much doubt). The installation charge per lamp (in addition to the £10 a year and the other costs not yet divulged) is estimated at £22 10s. a year, excluding columns, as the tramway posts will be utilized. At Westminster, the initial cost is quoted at £42 10s., including columns. The Inspector put the pertinent question as to why the Corporation proposed to change the lighting of these streets from incandescent gas-burners to electric flame arcs, and incidentally mentioned that he had himself been in one of the streets referred to the previous evening. He was asked what was his opinion of the lighting. His reply was that he must not express an opinion; but later on in the inquiry he naively introduced the remark that he had not yet been satisfied as to the necessity of the change. As this was after his visit to the street in question, sufficient has been said. The Electrical Engineer had, before the inquiry ended, to confess that he was only acting under the instructions of the Public Lighting Committee, which was tantamount to an apology for his position in the matter. The Ratepayers' Association opposed at the inquiry; and, from statistics presented on their behalf, it was seen how the ratepayers have been fooled over this electric lighting business. No less a sum than £4000 has been taken from the rates for the electric lighting undertaking; and there is still, so the Borough Accountant shows, a balance against the undertaking of £457. Public lighting has been costing the ratepayers £10,112, of which two-fifths have been absorbed in lighting 4 miles of thoroughfares by electricity, while the remaining three-fifths sufficed for the lighting by gas of about 80 miles. So far as we can trace, there are no funds set apart, in connection with the undertaking, for reserve or depreciation; machinery is going on the scrap-heap, and nobody knows whether or not the capital it represents has been discharged; the works are under-assessed, and so do not contribute their fair share to the rates; and it is now proposed to spend £8700 on further machinery. It is certainly not a cheerful outlook for the ratepayers.

An Association of British Manufacturers.

There has recently been started an important movement having for its object the organization of the manufacturing industries of Great Britain. Manufacturers, it is stated, feel that the time has now come when they must combine in order to protect their interests. The Association will be called the Manufacturers' Association of Great Britain. Its principal aims may be summarized as follows: To represent to the Government and to the country the principles, aims, and needs of manufacturers; to bring about closer relations between employers and employees; to deal with matters of common interest affecting manufacturers, such as legislation, taxation, rates, &c.; and to deal with matters of international interest. It is believed that relations between employers and employees will be greatly improved if an attempt be made to show that certain conditions of trade must affect both in similar proportion, that increased prices mean increased wages, that increased competition must lower prices and lower wages, and that bad trade must bring reduced employment. It is felt that the time has come when workmen should be instructed in the economics of production, in questions affecting organization, management of factories, and the effect of unlimited competition. The relative importance which manufacture bears to the prosperity of the country should also be more generally appreciated; and an effort will be made to show that its encouragement will help more than any other agency in the solving of our greatest national problem—viz., unemployment. A fundamental principle of the Association will be that party politics in every form shall be rigidly excluded. The Association will have temporary offices at Queen Anne's Chambers, Westminster, and the Secretary is Mr. Benjamin H. Morgan.

Large Gas-Engines on the Continent.—"It is reported," says the "Iron and Coal Trades Review, "that the leading Continental engineering works manufacturing very large gas-engines have dropped this branch as unprofitable; the market for such monstrous internal-combustion motors being limited, and their use having failed to spread farther than a few iron-works and collieries more or less connected with the makers of these engines. There has been no corresponding development of the manufacture of power gas suitable for such huge motors; and engineers responsible for almost the only power-generating plants (apart from blowing-engine) for blast-furnaces, for which they appeared to promise any advantage—electricity works on the largest scale—are not enthusiastic about them. The interest of mechanical engineers has been diverted from the mammoth variety of the gas-engine to the medium sizes, such as the 50-horse power motor, in relation to which the suction gas-producer is understood to occupy its most favourable position."

JUBILEE OF MR. THORNTON ANDREWS.

Presentations at Swansea.

When presiding at the meeting of the Swansea Gas Company early in April, Mr. T. Travers Wood referred to the fact that on June 1 Mr. Thornton Andrews, their Engineer and Secretary, would have completed fifty years' service with the Company; and, at his suggestion, a resolution was passed by the shareholders authorizing the Board to make such recognition of Mr. Andrews's jubilee as they might think fit. This happy idea was consummated last Friday week, when Mr. Andrews was the recipient of very tangible tokens of the esteem in which he is held, alike by the Directors, the shareholders, the officials, and the other employees of the Company.

The first presentation was made by Mr. Standish, on behalf of the officials. It consisted of an illuminated address, beautifully executed, conveying to Mr. Andrews congratulations on his completion of fifty years' service. Mr. Standish, who has himself been with the Company for the long period of 28 years, made some highly appreciative remarks; and in reply Mr. Andrews cordially thanked the officials for their kindness, and said he trusted the best relations would always exist between them.

Then Mr. Wood, in the presence of a large number of the proprietors, presented Mr. Andrews, on behalf of the Directors and shareholders of the Company, with a massive silver salver and a purse of 500 guineas. The salver bore the inscription:—

> Presented by the shareholders of the Swansea Gaslight Company, together with a purse of 500 guineas, to Thornton Andrews, M.Inst.C.E., on the occasion of the completion of his fifty years' service as Engineer, Manager, and Secretary of the Company, and in recognition of his eminent services, and untiring energy and ability during the above period. June 1, 1856-1906, on behalf of the shareholders of the Swansea Gas Company. Thomas Travers Wood, Chairman, June 1, 1906.

In making the presentation, Mr. Wood remarked that Mr. Andrews had superintended all the extensions of the gas-works during the period referred to; and this had obviated the necessity of taking outside expert advice on the occasions of their three applications to Parliament. When he joined them, the capital was £29,766; now it was £367,308. The gas made then was 12 million cubic feet; now it was 420 millions. The number of consumers had increased from 606 to 14,123; the mileage of mains from 15 to 105, and the capacity of the works per diem from 45,000 cubic feet to 3,500,000 cubic feet.

Mr. Andrews, in acknowledging the presentation, thanked the Directors and shareholders heartily for their magnificent gifts; and he then referred at some length to the history of the works. He said that when first started in 1830, the works were erected some 100 feet above sea-level. But it was found they were in the wrong place; and in 1845 small works were built on a portion of the present site. In 1856, when he joined the Company, they had a gasholder of a capacity of 45,000 cubic feet, which was now used as a tar-tank. The size of the works was then about 1 acre; and the greater part of the ground was taken up by a grass lawn. From 1857 to 1861, dividends were for the first time paid. In 1861, they obtained an Act of Parliament to extend; and the Mumbles (distant 5 miles) and Landore and Morriston (distant 3 miles) were supplied with gas just about that date. A large main was also laid across the River Tawe to supply Port Tennant. In 1888 and 1898, still further powers were obtained. The gas-mains now in Swansea would, if laid in a straight line, reach from that town to Gloucester. Some idea of the increased requirements of the town might be formed from the fact that 8000 new coin-meter consumers had been laid on since 1898. During the last seven years, the most improved machinery and plant, and a fine retort-house—the largest in Wales—had been erected. These extensions and additions had entailed a great expenditure; and to-day the outlay represented about £360,000, upon which the maximum dividend of 5 per cent. allowed by Parliament had been paid. In conclusion, he remarked that praise was due to the Directors for aiding him to carry out the requirements of the town with a ready hand—always seconding his efforts and helping him in every way with their advice, and governing the business of the Company in a liberal way for the public, and seeking always to do what was best for the interest of the shareholders and well-being of the concern. Without their aid, counsel, and determination, it would have been impossible for him to have carried out the work which had been accomplished in the last fifty years.

Subsequently, the whole of the employees assembled; and Mr. John Smallden (who has seen over thirty years' service with the Company), in a few well-chosen words, presented Mr. Andrews with a solid silver casket, of exquisite design and workmanship, having on the front a monogram and views of the works in 1856 and 1906, and on the cover a representation of Mr. Andrews's favourite dog. The Foreman, Mr. Dean, also presented a diamond and gold brooch and a silver spectacle case, suitably inscribed, as a gift from the men to Mrs. Thornton Andrews.

Mr. Andrews, in accepting the gifts, conveyed to the employees his appreciation of their kindness and thoughtfulness, and trusted that they would all enjoy a happy and prosperous future. On behalf of Mrs. Andrews, he returned her most sincere thanks for their kindness and handsome presents.

PUBLIC LIGHTING COSTS

In Wholly Gas-Lighted and Partially Electric-Lighted Districts.

It is with unalloyed pleasure that we can contemplate the strength and the soundness of the position of gas as a street-illuminating agent in contrast with the flaccid pretensions of our electrical friends. There is nothing wrong in the gratification that the possession of the simplest, most efficient, and most economical system of public lighting begets. The claim to such possession is not one founded upon mere bigotry; it is based upon fact. Our electrical contemporaries when they assert to the contrary only do so by the employment of vapid generalities. We would ask them to subdue for once their fancy for aërial flights which bring them to prices carried to the third decimal place, to prove a cheapness at per candle power per hour or per annum on the purely nominal candle power of lamps, and just address themselves to certain concrete facts drawn from the last batch of the valuable articles which have appeared in the "Standard" on the question of "How and Why the Rates Go Up." There is a persistent shunning of concrete facts on the part of our electrical contemporaries; and the time has come when they should settle down to an explanation of positive figures, and not run away from them by absurd comparisons such as they have indulged in hitherto. It may be confessed that we look for such an explanation with a great deal of curiosity, and the interest will be vastly enhanced if, at the same time, a statement is made as to what, in the opinion of electricians, are the tangible benefits that electrically lighted districts have secured in comparison with those that have preferred the greatly improved lighting that the incandescent gas-burner has given them without increasing expenditure. When a man is going to build a house, he does not reckon out the cost per brick, but he sits down and calculates the total cost of a dwelling that will meet with his requirements; and, in a similar business-like way, we should like a pronouncement from an electrical source on the total figures, and not what they represent strained to candle power per annum, that are before us for street lighting in certain parts of London.

As readers are aware, in the "Standard" rates articles, comparative figures have been given to show the upward rise in expenditure over a number of years in the various departments of municipal activity; and a separate line has been accorded to public lighting. One of the outstanding revelations of these comparisons has been that, where a borough has continued its allegiance to gas, there has been little or no increase in the cost of public lighting; while in all boroughs where electric lighting has been even only partially adopted, the cost of public lighting has bounded up by thousands of pounds. That is the simple point—taking actual figures—upon which we desire to see the explanation of an advocate of public lighting by electricity. In most of the border boroughs, the total mileage of streets has been increased; but there is the stubborn fact that, through reduced charges for gas and the economy of the incandescent gas-burner, improved street lighting (the illuminating power from each ordinary incandescent burner being four to five times that of the old flat-flame light) has been obtained at little or no increase of cost. The Camberwell Borough Council do not possess an electric lighting undertaking; and the lighting of the streets is at present done practically at the same cost as sixteen years ago. In 1888-9, the cost was £11,134; and in 1903-4 (the last year for which returns are given) it was £11,752. This is entirely owing to the incandescent gas-burner and the reduced price charged for gas by the South Metropolitan Gas Company. In the borough of Lewisham, there has been a great opening up of new roads in the outer parts; but nevertheless, whereas the cost for street lighting was £6436 in 1888-9 and had gone up to £8039 in 1899-1900, it was down to £7809 in 1903-4. Deptford, again, without an electric lighting undertaking, boasts a lower cost than any other borough in London. In 1904-5, it was only £4500, which is practically the amount the Council were paying in 1899-1900. The neighbouring borough of Greenwich, spent £5274 in 1901-2; and in 1904-5, £4616. This is another example of increased lighting and street mileage, but reduced cost, and yet adequate illumination, through the incandescent gas-burner. It is difficult in London to get districts that are strictly comparable; and Hammersmith and Hampstead have the nearest resemblance to Greenwich that the Commissioner of the "Standard" can find. Taking these districts, this is what he observes: The 60 miles of Greenwich streets were lit in 1903-4 (also in 1904-5) by gas, at a cost of £4616, equal to £77 per mile. The 50 miles of Hammersmith streets, with municipal electric lighting, cost £8374, or £167 per mile; and the 58 miles of Hampstead roads, also with municipal electric lighting, cost £11,658, or £201 per mile. The lighting rate in Greenwich in the year quoted was 1·75d. in the pound; in Hammersmith, 2·91d.; and in Hampstead, 3·22d. The apologists for Hammersmith and Hampstead may say the roads are better lighted than are those at Greenwich, to which we should without hesitation reply that the roads of Greenwich are sufficiently lighted. There has been ample experience now for an answer if one is to be found to the question, In what ways have Hammersmith and Hampstead benefited over Greenwich by paying respectively £167 and £201 per mile for street lighting against £77 per mile in Greenwich?

We have not done yet. Woolwich has still to be dealt with; and it comes into fair comparison with the other boroughs south of the Thames, seeing that the South Metropolitan Gas Company serve the district with gas. Woolwich is also of interest because we are in the immediate presence of a tremendous increase in the expense of street lighting owing solely to patronage of the Council's own electricity undertaking. In 1901-2, the cost of public lighting was £6079; in 1902-3, it was £8343; in 1903 4, £7292; in 1905-6, £7783; and the estimates for the current year include a charge of no less than £9580. The decrease in the cost after 1902-3 was due entirely to the reduction in the price of gas by the South Metropolitan Gas Company. Then the upward move in cost recommenced—not because of any increase in the charge for gas, but wholly owing to the supersession of gas-lamps by electricity. In 1905-6, the streets lighted by electricity cost £3391; and the estimate for electric lighting for 1906-7 is £5100. The difference between these figures is £1709; and the difference between the total cost of street lighting in 1905-6 and the estimated cost for the current year is £1793. This, as is pointed out by our contemporary, is a big jump for one year—all due to electricity, excepting (of the last-named figure) the small sum of £80 odd; the cost of gas and lamps last year amounting to £4392, and the estimate for the coming year being £4480. The explanation is stated by our contemporary to be this, and we have no doubt it is the correct one: "In the absence of any demand on the part of the general public for electric current, the Council are evidently determined to increase their own consumption." Let us stop for a moment on this point. At the end of March, 1905, the debt on the electric lighting undertaking was £180,850; and, in addition, there was an overspent balance on capital account of £39,660. Since 1902-3, there have been direct subsidies from the rates of £27,517, including the estimated deficit in 1906-7. Consider this together with the increased payment through electricity for public lighting. The deficiencies have been incurred notwithstanding that street lighting has been charged at an average of 3·75d. per unit, against an average charge of 3·54d. to the private consumers. The report of the Local Government Board Auditor issued last month states that the electric lighting "accounts do not bring out the full amount" of the deficiencies incurred, "because the charge made for current for the public lighting up to September, 1905, was actually in excess of the scale charge for private lighting." The Council have already borrowed an additional £5344 for the purchase of arc lamps. We pity the Woolwich ratepayers.

There is only Fulham to be dealt with now. In 1899-1900, the cost of public lighting was £5472; in 1903-4, £10,858; in 1904-5, £12,166; and in the present year £13,000. This is progressive public lighting with a vengeance. The electricity undertaking was inaugurated in 1901. There would be no need to say more to point the moral of the ascending figures; but the Fulham Council have shown a strange perverseness in their attitude towards incandescent gas lighting. We have seen that, without increasing or without any very material increase in their annual costs, other Borough Councils have been able to obtain all the advantages of incandescent gas lighting. The Fulham Council could have done likewise; but it did not suit them to do so with an electricity undertaking hanging round their necks. The increase in the mileage of the roads of Fulham has only in the past 16 or 17 years been about one-third. In 1889-90 the cost of street lighting was £4170, and in the current year £13,000; so that the cost has trebled. This is entirely owing to the Council fearing to lose any opportunity—however unjustified and oppressive it may be—to make their electricity undertaking appear profitable. For this reason, the Council have refused the Gaslight and Coke Company's offers to instal incandescent gas lighting, as this would bring the light into too close a comparison with their own electric arc lamps; have already accumulated a debt of £7821 on further electric arc lamps, and are adding to it yearly; have increased the annual cost of lighting in the manner shown; and withal, according to the County Council's annual returns, the total contribution from the rates in aid of the electricity undertaking up to March, 1905, was £21,277, without saying anything about the neglect of depreciation. An explanation attempting to justify the increase of the cost of lighting from £4170 to £13,000 in seven years, would be welcome.

In view of such facts as those presented in the foregoing paragraphs, it is not an unfair thing to ask those who vaunt that in electric arc lighting they have the cheapest and most efficient system for street illumination, to take the figures from those boroughs without, and those boroughs with, electric lighting as given here and prove the superlative cheapness. For with the cheapest and most efficient light at their command, the cost of lighting instead of ascending should descend. As the contrary is without exception the case, it is for electricians to explain the reason for the anomaly that the boasted "cheapest light" is in the result the dearest for the ratepayers. The "Standard" has rendered an immense service in their exposure of the extravagance which is the most pronounced feature of local government in the Metropolis; and from our point of view not the least part of this important service has been the production of incontrovertible and remarkable figures that show how much the use of electricity for street lighting has added to the burdens of the ratepayers wherever it has been adopted.

Sir John James Harwood, J.P., of Manchester, whose death was recently recorded in the "Journal," left estate of the gross value of £69,429, with net personalty of £51,776. Mr. George King Harrison, J.P., of Hagley, Worcester, who died on April 16, left property valued at £112,238 gross and £92,276 net.

HIGH-PRESSURE GAS LIGHTING AT THE NEW VICTORIA STATION (L. B. & S. C. R.).

AGAIN incandescent gas lighting has scored by its superlative merits for railway station lighting. We can allow the electricians to "flap their wings" until they are tired over the Charing Cross station lighting with such a brilliant example of the efficiency of gas for similar purpose as is now in evidence at the new Victoria station of the London, Brighton, and South-Coast Railway. The fact that a system of incandescent gas lighting has been chosen for the new station against the latest that electricity can offer, is in itself a matter for the greatest gratification, seeing that, from beginning to end, it has been the aim of the Chief Engineer of the Company to incorporate in this station all that the amassed experience of the past has proved to him as going to constitute a perfect London railway terminus—perfect for dealing with the constant heavy incoming and outgoing traffic, and perfect in its arrangements for the safety, comfort, and convenience of the passengers using the Company's vast system. It is a no mean victory for gas, as two or three particulars about the station itself will show. Nearly ten years have been absorbed from the commencement of operations to the opening last Sunday of a large part of the new station; and it is calculated that yet another two years will be consumed before the final touches have been made to the scheme. Not far short of $2\frac{1}{2}$ millions of money is the estimated cost of this large work in railway engineering and building. The area covered by the new station is 320 feet wide and 1600 feet long. The general arrangement of the station does not concern us here; but these few particulars indicate that not a little importance attaches to the question of its lighting.

A railway station, for the proper protection and comfort of the passengers, requires a system of lighting which will diffuse the illumination uniformly, without shadows, glare, and flickering, be reliable in all weathers, and not subject to those frailties which produce at inconvenient times sudden collapse. And that perfection of lighting is what the new Victoria Station possesses. The question of its illumination received the very careful consideration of the Directors and Chief Engineer of the Company, who had to decide between high-pressure gas lighting and electric flame arc lamps; and their decision was in favour of the former, as will be remembered was also that of the Directors of the North London Railway Company in respect of their Broad Street terminus. The Directors of the Brighton Company had before them their own remarkable experience of the lighting of the old Victoria Station, in which they have effected a saving of no less than £1100 per annum, in addition to realizing a greatly improved illumination, by substituting ordinary pressure incandescent gas-lamps for electric arc lamps, supplied with current at about 2d. per unit. For electric lighting for this new station

The Lighting of the New Victoria Station.

electricity was on offer at a trifle over 1d. per unit. Even at that abnormally low price, the Directors considered that the advantages of high-pressure gas lighting, combined with its dependability, transcended the best abilities of electric lighting.

A private inspection of the lighting of the station on Saturday evening—the day before the opening—gave complete satisfaction on all points, as it has done to the railway authorities. We reproduce a photograph taken at night time by the aid of the lights. The preparation of an illustration from a photograph, together with its reduction, causes some loss in clearness and effect. In the photograph, however, the statement as to the excellent diffusion of the light receives abundant corroboration; and the detail, even to the small work on the columns, comes out splendidly.

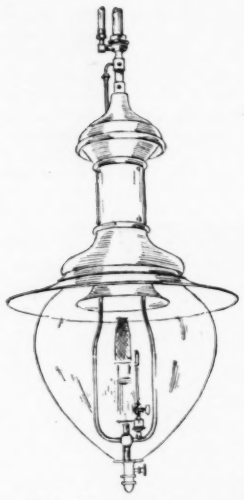
When complete, the station will be lighted by nearly 400 lamps, varying from 175 to 1000 candle power, and giving a total light of about 140,000 candle power. The gas is supplied at a pressure of 50 inches from two Sale-Onslow compressors (each capable of delivering 5500 cubic feet per hour), driven by gas-engines—the plant being duplicated throughout, and the shafting so arranged that either engine can drive either or both compressors, in order to guard against the possibility of breakdown. Two smaller compressors that can be run from the same shafting have been fixed for use when only a small number of lights are in use. The compressors are supplied through two 500-light dry gas-meters (made by Messrs. George Glover and Co., Limited), interconnected and bye-passed, which are fed by a 6-inch main.

The platforms are lighted by Sugg's "Chertsey" pattern lamps of 350-candle power, except in the case of those on either side of the carriage drive, which are lighted by lamps of 500-candle power. The lamps are placed one between each pair of columns carrying the roof; so that there is an entire absence of shadow. The distance between the lamps is about 50 feet, measuring along the platform; and they are hung so that the burners are about 12 feet from the platform level. By this arrangement, the light, we can bear witness, is very evenly diffused, is fully sufficient in every part, and very effective without being in the least irritating to the eye.

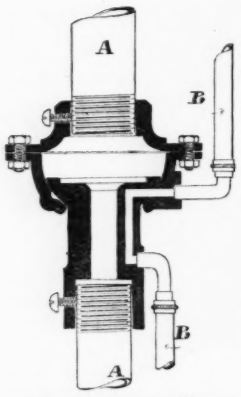
The platforms are divided into sections by the Eccleston and Elizabeth Bridges, under which they pass; back-lanterns being chiefly used for lighting the portions under the bridges. The lamps lighting each of the platform sections are controlled by two conveniently arranged taps (specially devised for the purpose by the Gaslight and Coke Company), placed at the end of the section—one tap controlling Nos. 1, 3, 5, &c., lamps; and the other Nos. 2, 4, 6, &c. Therefore every alternate lamp can be lighted or extinguished in series from the control point; and so any portion of the station can, when there is no traffic there, have its consumption of gas reduced to half in the easiest manner possible. This is indeed an interesting feature of the installation for both gas men and railway officials. To enable this lighting and extinguishing in series to be performed from the one point, dual services have been run, with a third independent service for the bye-pass supply. A cup-and-ball joint (specially designed by Messrs. William Sugg and Co., Limited) is used for connecting the down-rod of each lamp to one of the two main supplies and to the bye-pass service; the one cup-and-ball serving for the two connections. Each lamp is connected to the down-rod supplying it by a cup-and-ball; so that the effects of

vibration on the mantles are reduced to a mimimum. A special mercurial seal (also devised by Messrs. Sugg and Co.) is fitted to each down-rod. This small apparatus automatically closes the gas-way when the main cock, or distance-control tap as it is called, is turned off; and thus, while preventing air getting into the pipes, keeps them full of gas, so that, when the main cock is turned on, all the lamps on the series light up instantaneously. The whole arrangement is most efficient; and it is very interesting to observe the manner in which the lights answer to the turning of the control tap a distance away. Turn off a tap, and the lamps controlled by it are slowly extinguished; turn the tap on, and the lamps light up immediately to full brilliance. The lamp suspension rods, it may also be mentioned, are fitted with taps to enable any lamp to be removed without shutting off the supply to the platform generally.

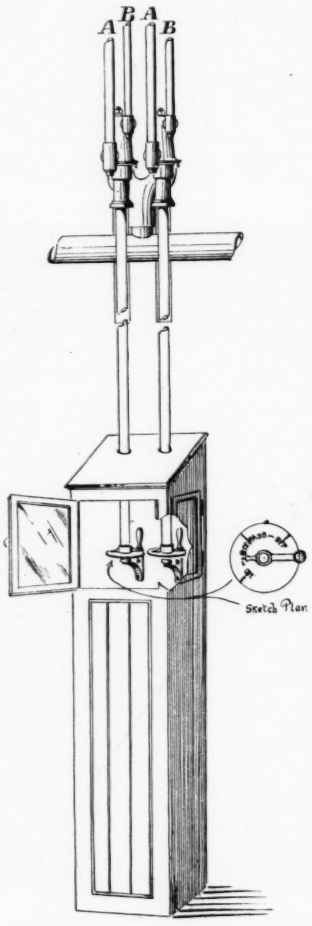
Regarding the bye-pass service, each section has a governor regulating the pressure to 2 inches; and the bye-passes are completely extinguished by the action of lighting the lamps.



The "Chertsey" Lamp.



Cup and Ball and Down Rod, showing Method of Running Two Gas Supplies to the Suspension Lamps—One for the Incandescent Burner; the other for the Flash Light.



Sugg's Specially Devised Main Cock for Controlling the Various Series of Platform Lamps and Back Lamps under the Bridges, enabling All or Half the Lamps as required in each Platform.

A. Main Supply. B. Flash Light Supply.

The station yard beyond the platforms is lighted by four "Belgravia" lamps (each of 1000-candle power) on effectively designed weldless steel columns—two 25 feet and two 30 feet high. The lamps are worked by distant-control taps similar to those used on the platforms, placed at the base of the columns—thus avoiding the necessity of climbing the ladder to light or extinguish the lamps.

The scheme for the lighting of the station, as submitted to and approved by Mr. Charles L. Morgan, the Engineer to the Railway Company, was prepared by the Gaslight and Coke Company. The work of installation was accordingly entrusted to them, and is being carried out by their Contractors—Messrs. William Sugg and Co., Limited—under the direction of the Company's Chief Inspector, Mr. F. W. Goodenough. We congratulate the Railway Company, the Gaslight and Coke Company, and all who have been personally engaged in the work. It will be examined critically in the future by friend and competitor alike, as the latest example of up-to-date gas lighting for a railway station. We at all events have no fear as to the nature of any conscientiously given verdict.

GERMAN GAS AND WATER ASSOCIATION.

Annual Meeting at Bremen.

The programme of the proceedings at this important meeting—which, as already announced in the "JOURNAL," opens on Wednesday, the 27th inst. and closes on Monday, the 2nd of July—has now been issued. Members will assemble on the 27th inst. for a reception and concert that evening in the Park House of the Bürger Park.

The technical proceedings commence on Thursday, the 28th, and will occupy the morning hours of this and the two following days. The Thursday will be devoted—after the formal opening of the meeting by the President, Herr Körting, the Manager of the Hanover works of the Imperial Continental Gas Association—solely to lighting matters. The papers to be presented this day include the following: Description of the Bremen Gas-Works, by the Manager, Dr. Schütte; Description of the Bremen Electricity Works, by the Manager, Herr Süchting; The Dessau Vertical Retort-Settings, by Dr. J. Bueb, of Dessau; Experiences with Stoking Machinery, by Herr L. Körting, of Hanover, Herr Lubszynski, of Crefeld, and Herr Tasch, of Lichtenberg; Report on the Instructional and Experimental Gas-Works of the Association, with Statistics of German Gas Coals, by Dr. H. Bunte, of Carlsruhe; Cooled Grate-Bars, by Major F. Walter, the Works Manager of the Vienna Municipal Gas-Works; and the Position of Incandescent Gas Lighting, by Professor Drehschmidt, of Berlin. The last-named communication will deal with artificial filaments for mantles, technical characteristics of the inverted incandescent gas-light, and the use of the incandescent gas-light for lighting large open spaces.

Friday, the 29th inst., will be devoted to papers on water supply, among which will be: Water Supply of Bremen and the Underground Water in the Vicinity, by Herr E. Götze, the Manager of the Bremen Water-Works; Underground Water for Large Towns, by Herr Eggert, of Berlin; Water Supply of Berlin, with the Gaining of the Underground Water and the Removal of Iron therefrom, by Herr G. Anklam, of Friedrichshagen, near Berlin; Underground Water Supply of Hamburg, by Herr O. Schertel, of Hamburg; Development of Works Machinery for Water-Works, by Herr Reese, of Dortmund; Judging the Degree of Purity of Surface Waters by reference to Animals and Plants, by Professor P. Schiemenz, of Friedrichshagen, near Berlin; Well-Sinking for Maintaining a Dry Subsoil, by Herr E. Prinz, of Berlin; and a communication against the divining rod.

On Saturday, the 30th inst., Herr Dieterich, of Leipzig-Gohlis, will read a paper on "Coal and Coke Conveying Apparatus on Gas-Works," and then the reports of the numerous technical Committees appointed by the Association will be presented by the respective Chairmen. The election of officers for next year, and other private business, will be dealt with on this day.

As is customary with the German Association, the programme of excursions and festivities is very full. The afternoon of the Thursday is allotted to a steamboat trip to the Bremen Gas-Works, after inspecting which a return will be made for an evening's entertainment to be given by the Senate of the City. The Friday afternoon will be devoted to a visit to the electricity works, and the evening to a banquet. On Saturday afternoon, the new water-tower and the Bremen Water-Works will be inspected, in conjunction with a steamer trip; and in the evening there will be an open-air concert. On Sunday, the 1st of July, an excursion has been arranged to Heligoland, on one of the large steamers of the North German Lloyd, at the invitation of the Steamship Company. A special series of functions has been planned for ladies for the mornings on which the technical proceedings are arranged. There will be a collection of exhibits bearing on gas and water supply. A large muster of members and guests is anticipated at the meeting.

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

Programme for the Annual Congress.

The Annual Congress of the Société Technique du Gaz en France will be held (as already announced in the "JOURNAL") in Paris, from the 19th to the 22nd inst. The proceedings will be opened in the hall of the French Society of Civil Engineers on the morning of the first-named day, by the genial President, M. Visinet, who holds office for the second year. The first business will be of the usual routine character—viz., the admission of new members, the reception of the reports of the Committee and the Treasurer, and the nomination of members of the Committee. After the midday interval, the names of the office-bearers will be announced, and reports will be presented on the prizes awarded to the authors of the best papers submitted at last year's congress at Havre, and to the most meritorious workmen. These matters having been disposed of, the reading and discussion of the papers will be commenced, as apparently there will be no address by the President. There are 23 communications (an indication of the nature of which is given below), and a report on the trials of various gas-heating appliances sent in to compete for the Society's prizes. The papers will occupy the

members on Tuesday afternoon and the whole of Wednesday; and in the evening of the latter day there will be the usual subscription banquet in the restaurant of the Palais d'Orsay. Thursday will be devoted to an excursion to Versailles and a visit to the gas-works; and on Friday morning the members will inspect the tar-works at the Villette station of the late Paris Gas Company, and in the afternoon go by tram to St. Denis, to see the generating-station of the Paris Electricity Supply Company. This visit will bring the congress to a close.

With regard to the papers, there are four which deal with the manufacture of gas. M. Bouvier will present a "Memento" for making combustion calculations in connection with gas-furnaces; M. Cabrier will describe a system for automatically charging horizontal retorts; M. Laforgue will direct attention to an appliance for charging retorts by hand, and unsealing them; and M. Laurain will show how a horizontal retort-house can be fitted up with coal and coke handling plant. The remaining papers are of a somewhat miscellaneous character. M. Seghers will introduce the Jäger purifier grids; and M. Steger will discourse on the Kramers and Aarts water-gas system. M. Payet (the Secretary of the Society) will deal with the effect of gasholders on the quality of gas they contain, and also with the changes in quality which gas undergoes in process of manufacture; and he will present a report of some trials of a water-gas generator. M. Delahaye will inquire how far carbon monoxide is responsible for the anæmia prevalent among Parisians; and M. Hedde will describe an oxylithic respirator for use in dangerous atmospheres. M. Despierre will present a note on the repair of a gasholder tank. M. Maldant will offer some remarks on the fraudulent consumption of gas by tilting meters, and introduce to the notice of the members a mixture compounded by MM. Commelin and Viau, and called "L'Energique," and show how it can be applied in connection with the gas industry. M. Casaubon will explain a new calorimetric method; and M. Laurent will point out the special features of the Mecker burner, whereby high temperatures may be obtained for heating purposes. The remaining papers deal with the use of gas for cooking purposes in large establishments, the lighting and extinction of gas at a distance, and some other subjects, including a school for instruction in gas and a gas dictionary.

AN ILLUMINATING ENGINEERING SOCIETY.

Mr. Leon Gaster's Proposal.

In the course of a paper recently read before the Society of Arts, on "Progress in Electric Lighting," Mr. Leon Gaster pointed out that there is a wide field open for the illuminating engineer; and in an article in the "Electrical Magazine" he emphasized this matter, and suggested the formation in this country of an Illuminating Engineering Society, on the lines of that established in New York, to which reference has been made in our columns. In a letter to us, enclosing a reprint of the article, the principal portions of which are given below, Mr. Gaster says: "The formation of an Illuminating Engineering Society will contribute largely to advance and disseminate the knowledge relating to the science and art of illumination. The merits and faults of the different illuminants now used for public or other lighting purposes will have a better chance to be discussed on a more scientific basis, and the sphere of useful application be easier defined for each of them. There is no doubt that great economies can be derived from the judicious selection of the system of lighting adopted, and the type of lamps, shades, reflectors, &c., used for different purposes. The annual expenditure for lighting purposes in the United Kingdom has been estimated lately to exceed £35,000,000; and it can easily be seen that only a small increase in the efficiency of the systems used will amount to considerable savings per annum. The time is ripe for such a step being taken as advocated in the article; and I trust that it will be beneficial to all interested in obtaining better and more efficient illumination."

Until recently insufficient attention has been given to the systematic application of the scientific principles of artificial illumination, the degree of illumination desirable for different purposes, and the disposition of light sources for artistic effect. All these have been mostly ignored, or, to say the least, on account of lacking exponents, have not been accorded the prominence due to them. The different purposes for which artificial light is required call for special treatment if the best results are to be obtained; and it is therefore regrettable to note that in many cases recourse has been had, for effect, to extravagant illumination without due regard to expense or to the effect on the eyes from the glare. The reverse has happened in other cases; so that little light has been used on account of cost, and even this has not always been turned to the best advantage. My object in writing this article is not to make only a complaint, but, if possible, to indicate how, in time to come, this deserved reproach of neglect may no more be justifiable.

Considerable work has already been done by several investigators *re* the absorption and distribution of light from shades, globes, and reflectors. The data obtained on this subject are, however, very much scattered, and no uniformity exists in the results of the reported tests. The great variety of systems of photometric measurement and apparatus used by the different observers explain, to a certain extent, the reason for these differences. The value of engineering data of this kind lies largely in their use for making comparison of one reflector, shade, or globe with another; and it is therefore gratifying to find that recently Messrs. J. R. Cravath and V. R. Lansingh have drawn all their data, published in their admirable articles *re* reflectors, shades, and globes in the "Electrical World," from tests made in a single laboratory. The results of these tests are, therefore, of great value for comparison. The immediate practical application of the data given is evident when one considers the great improvements which can be obtained in planning illumination by incandescent lamps, by knowing what types of reflectors, shades, and globes have to be selected, so as to change the natural distribution of light from the bare source for the accomplishment of a desired effect. In examining many of the existing installations, one is often struck by the awkward position in which the lamps are placed, which can hardly be traced to the former use of gas and gas-fittings.

In order to advance and disseminate the knowledge relating to the science and art of illumination, an Illuminating Engineering Society has been established in New York, which was formally organized at a meeting held on the 10th of January last; its first President being Mr. L. B. Marks, and its Secretary Mr. E. L. Elliott. The Society started with about 89 members, but now it is estimated to consist of over 350. The objects of the Society are to co-operate with other bodies having an interest in securing the best results from the various illuminants. Such Society is expected to accomplish an admirable purpose, both directly and indirectly, through its papers, exhibitions, and discussions, and by bringing together and co-ordinating the now widely scattered knowledge on the subject, and extending it by recording data and by furthering the systematization of practice. The Society is to embrace naturally the different illuminants, and will contribute largely in furthering the interests of the lighting industries—electric, gas, and oil.

Much has been done by central station engineers to bring down the prices at which electrical energy can be generated by adopting improved methods of power generation. Although there is still a great possibility for further reducing the price of the current in the future, the immediate economy to the consumer lies in properly studying the selection of the most efficient type of lamps, by careful distribution, and by a selection of shades and reflectors; and for this purpose the future illuminating engineer can come to his assistance. The present gap which seems to exist between the supply authorities and the consumer demands the creation of a distinct illuminating engineering profession which will be expected to make a special study, not only of the merits of electric lighting, but be also well acquainted with the merits and faults of other systems of illumination. Only from such experts can one reasonably expect unbiassed opinions as to the best systems of lighting to be adopted. Very often one is confronted with the problem of deciding whether gas, oil, or electric light is best to be employed; and only by properly studying the circumstances of the case—viz., the price per unit of electric energy charged, that of gas or oil, and the purposes for which the light is to be utilized, &c.—is one in a position to decide what system would be best and most economical to adopt. For the present, it is hardly possible to find that expert engineer of whom I am speaking now, because he is, as a rule, either interested in electric lighting or in pushing gas lighting, and we find that, according to his inclination, he may be biassed in his decision. Moreover, it might appear in a good many cases that a combination of two systems would prove economical. Such cases have frequently come before my notice—one part of the works using gas, and the other electric light; but it is exceptional that one finds an engineer to recommend the use of both systems.

Gas engineers have nursed their consumers much more by looking after the lighting business, greatly extending the use of mantles, and have made the gas lighting what it is. There is, however, I believe, still more to done in this respect by gas engineers. Some think that great economies are to be derived in the future from further improvements in the manufacture of gas, and from the gas companies being relieved of the duty of producing gas of specified candle power. They would prefer to use the gas as a heating agent, and, indirectly, for lighting purposes, as in the use of gas-mantles. Then gas would be cheaper, and it would find more extended employment also for heating and motive power purposes.

For the use of oil, improvements are constantly being made in the manufacture of lamps; in particular with the high candle power oil vapour lamps of Kitson, Lucas, "Lux," "Millennium," &c., types, or of the alcohol vapour type. Acetylene gas has obtained considerable vogue the last few years; and so have many more illuminants.

In examining the figures given by Mr. Marks in his Presidential Address, one finds that the annual expenditure for lighting purposes in the United States is roughly estimated to be about £40,000,000. The expenditure in this country, so far as I am able to ascertain, may be estimated roughly to be classified as follows: Between £20,000,000 and £22,000,000 per annum for gas lighting, £7,000,000 to £8,000,000 for electric lighting, and over £5,000,000 for oil—amounting in the total to between £30,000,000 and £35,000,000, of which, if only 5 per cent. were annually saved, over £1,500,000 could be turned to better advantage, giving better illumination to the public, and providing employment for a large number of engineers who would willingly specialize for this particular new branch of the art.

From what has been said before, I venture to suggest that the time is ripe to inaugurate a similar Illuminating Society in this country. The merits of the different illuminants could then be properly studied, and the useful application be defined for each of them. An "Institution" could afterwards be created, in which all the different illuminants would have a fair chance of being shown under the best conditions, and their relative merits properly gauged. A permanent exhibition would thereby be formed, which, to my mind, would be of great benefit to consumers, and of exceedingly important educational value to the future illuminating engineer. For the present he has not enough opportunity of being educated to become such an expert; and this will then be afforded to him through lectures by the best professors and known experts familiar with the different illuminants. He would then know not only one of the illuminants, as is mostly the case at present, but would become perfectly conversant with the merits and faults of all, so that he could conscientiously and properly advise his clients as to the actual merits of the different illuminants for the different purposes in view.

Without wishing in the least to dictate any course of action, I should

think that a powerful body such as the London County Council, for example, may in time see its way to grant a fund for the building and maintenance of such a permanent home for the different illuminants. Many local authorities who are owners of gas and electric plant will be only too glad to know how they can reasonably utilize the different lighting commodities to the best advantage of the ratepayers. We have an example in the street-lighting question, in which the differences of opinion are so great that one feels the necessity of some central authority to advise on these matters, and to settle what is best adaptable for the different kinds of streets in towns. London may reasonably become the leader.

The technical side, however—viz., the close investigation of the relative value of the different illuminants as regards candle power given out, the consumption of energy, electric, gas, &c., and other such questions—can be conveniently undertaken and settled by the National Physical Laboratory; the work being done for the benefit of the public. The practical application of the different illuminants could then be constantly demonstrated at the future Illuminating Institution which I am picturing, conducted by properly qualified and trained illuminating engineers. A museum might advantageously be established, attached to the Institution, in which the progress and development of the different systems of illumination could be kept on record. Naturally, I should also like to see there a specially well-equipped library for reference.

It is anticipated that in this Illuminating Engineering Society no antagonistic feeling should be created between different illuminating engineers; on the contrary, each should contribute to bring apparently conflicting interests closer together, expounding and exchanging views on the relative merits of the different illuminants.

The formation of an Illuminating Engineering Society ought to receive hearty support from the Councils of the Gas and Electric Institutions, and of the newly-formed British Science Guild, whose object is to try to convince the people, by means of publications and meetings, of the necessity of applying the methods of science to all branches of human endeavour. For promoting and extending the application of scientific principles to industrial and general purposes, and furthering the progress and increasing the welfare of the Empire, it should take this opportunity and utilize its great influence in encouraging the formation of this Society.

I have refrained from giving any data, or mentioning names of consumers or of places where the advantages derived from the advice of the illuminating engineer have been proved beyond doubt, as most of the lighting engineers can bear me out that, in many cases where they had a free hand and dealt with reasonable clients, great economies and satisfaction have been derived from the proper application of scientific principles of artificial illumination.

The growing recognition of illuminating engineering as an art is indicated by the recent establishment at the American General Electric Company's works of a special department of illuminating engineering, in charge of an expert. Among other purposes of this department will be the co-operation with central station engineers in submitting attractive lighting plans to prospective customers.

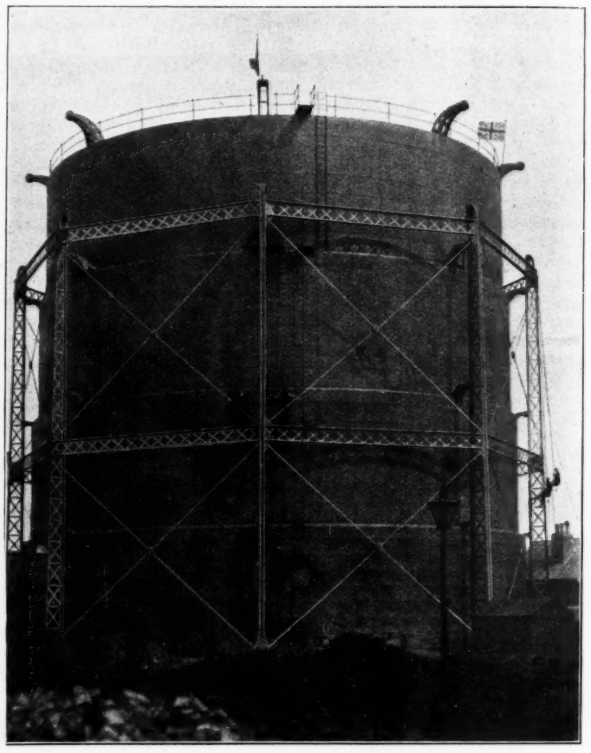
Mr. Gaster concluded his article by giving a list of the papers to be read before the New York Society, and again urged the advisability of forming a similar body in England. He will be glad to receive, at his address already given, the names of any engineers willing to co-operate with him in the undertaking he has sketched out.

COST OF THE TORQUAY WATER SUPPLY.

WHILE it is essential that the water supply of a health resort should be both good and abundant, there is no reason why even a health resort should be extravagant in purchasing these advantages. The Torquay Corporation have in recent years laid out a good deal of money on their water undertaking. The purchase of the land constituting the watershed and the closing of the farms was a necessary, though costly, operation. While farming was being carried on within the drainage area, there was always the risk of the water supply being contaminated; and though the danger was possibly remote, Torquay rightly felt that in such a matter cost was not the first consideration nor the most important one. Whether it was necessary to follow up this measure by the construction of a new storage reservoir is a question upon which local opinion has differed, and will continue to differ. On the one hand, it is said that more storage is necessary, because at one time the town was within ten days of exhausting its supply of water; on the other, it is argued that, whatever may have been the circumstances which led to the scarcity at that particular time, the town has never had reason to complain of shortness.

It was, perhaps, only a coincidence that the new reservoir scheme was put forward at a time when the neighbouring town of Teignmouth was considering a project for obtaining water from the same locality. If it is really the fact that Torquay decided to construct a reservoir which it did not immediately need, in order to prevent its neighbour appropriating the water, its action would not be without precedent. It is unfortunate for the ratepayers of Torquay that the reservoir will cost nearly three times as much as the original estimate. This also is a thing not without precedent. It very often happens that there is a wide difference between parliamentary estimates and the actual cost. In this instance it seems to be largely due to the difficulties encountered in excavating a site for the masonry dam. There can be no doubt, however, that the original estimate was cut very fine all round. In every direction the actual expenditure has proved to be largely in excess of the estimate. The tendency to minimize the probable outlay is very noticeable in connection with municipal and other undertakings dependent upon popular support. It is largely stimulated by the ease with which sanction can be obtained for additional loans. If borrowing for municipal undertakings were restricted to the original estimates, there would be a notable addition to the figures now laid before Parliamentary Committees; while many schemes would never be entered upon at all, because it would be seen from the outset that the cost would be too great. As it is, they are begun with a small capital, and then double or treble the amount is borrowed on the plea that it is impossible to abandon work on which money has been spent. Municipalities would receive a useful lesson if they were given to understand that any excess in the cost of their works over the original estimate would have to come out of the current rates.

THE TELESCOPED GASHOLDER AT LONG EATON.



The above photograph represents the four-lift gasholder—80 feet in diameter by 20 feet deep each lift—which was converted from a single-lift by Messrs. Clayton, Son, and Co., Limited, for the Long Eaton Gas Company, in the short space of two months, as mentioned in the paragraph that appeared in last week's "JOURNAL," p. 631.

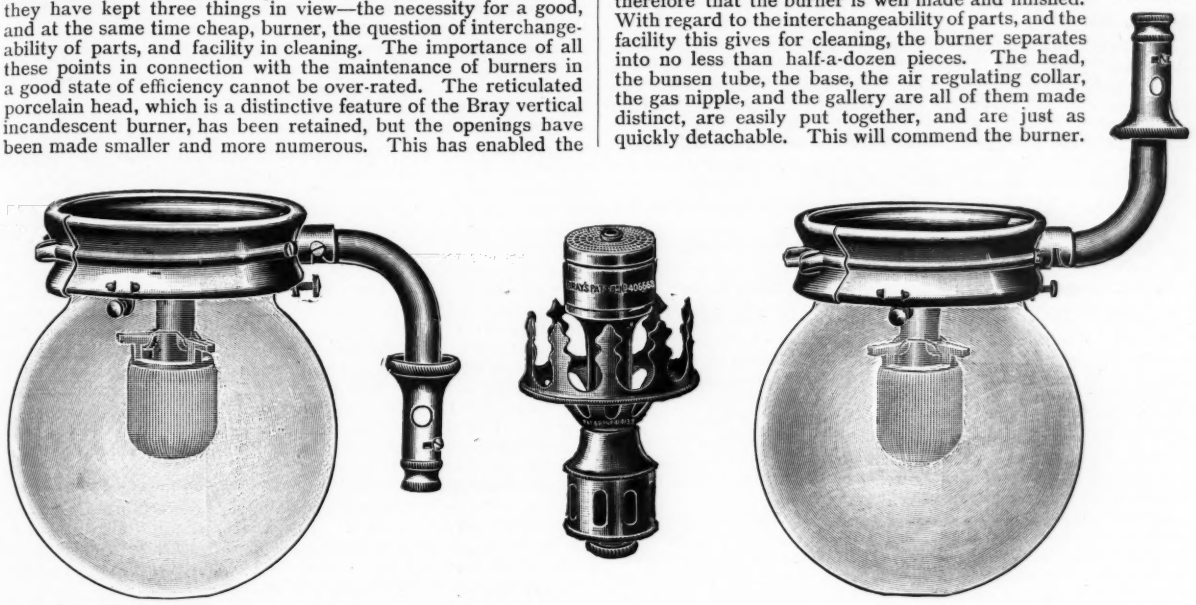
In a recent number of "Chemische Industrie," Herr C. R. Boehm gave a detailed bibliography of the literature relating to the discovery of rare earths, from the detection of an unknown earth metal in scheelite (Schwerstein) from Bastnäs by Cronstedt in 1751, and its isolation, and naming as cerium, by Berzelius and Hisinger in 1804. The bibliography is divided into four sections, giving the history of the cerite and ytterite elements, and of thorium and zirconium.

Some valuable results of an experimental investigation on the effect of fire on building stones were described by Mr. W. R. Baldwin-Wiseman at a recent meeting of the Surveyors' Institution. The purpose of the research was not so much to determine the design of a building for fire resistance, as to estimate the ultimate stability of an edifice after subjection to a severe conflagration, and to afford some assistance to those who may be called upon to decide whether demolition or reconstruction shall succeed the wrecking influences of a big conflagration. The points of primary importance in determining the most efficient design for fire resistance are summarized as follows: (1) That the edifice should in no wise be flimsy; (2) that it should be constructed of stone possessing a uniform or fairly uniform coefficient of expansion, and retaining a considerable strength after subjection to high temperatures; (3) that all combinations of different stones should be avoided as much as possible; (4) that combinations of stone and metal should be avoided, especially when the former rests directly upon the latter, even when the metal is entirely enshrouded in stone, for stone acts as a fairly good conductor of heat; (5) that stair wells and lift wells should open as little as possible on to the main building, and should be wholly enclosed and glazed with wired glass; (6) that floor areas should not be unduly large or the corridors unduly long.

BRAY'S NEW INCANDESCENT BURNERS.

Ever moving with the times, Messrs. George Bray and Co., Limited, have made certain improvements in their incandescent burners which render them adaptable to all lighting purposes and situations. In the new design of their series of "C" burners, they have kept three things in view—the necessity for a good, and at the same time cheap, burner, the question of interchangeability of parts, and facility in cleaning. The importance of all these points in connection with the maintenance of burners in a good state of efficiency cannot be over-rated. The reticulated porcelain head, which is a distinctive feature of the Bray vertical incandescent burner, has been retained, but the openings have been made smaller and more numerous. This has enabled the gauze in the head to be dispensed with, without in any way depreciating the non-lighting back character of the burner. The burner is somewhat shorter and lighter than its precursor; but this is not a drawback, for the example on view at the London show-rooms, No. 17, Farringdon Street, show that the firm have no intention, in producing a cheaper burner, to do so by sacrificing their reputation for high-class work. It need hardly be said therefore that the burner is well made and finished.

With regard to the interchangeability of parts, and the facility this gives for cleaning, the burner separates into no less than half-a-dozen pieces. The head, the bunsen tube, the base, the air regulating collar, the gas nipple, and the gallery are all of them made distinct, are easily put together, and are just as quickly detachable. This will commend the burner.



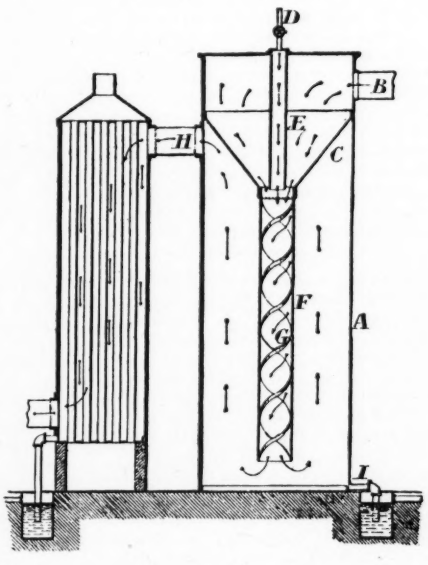
Although samples are now to be seen, it is understood that the burner will not be ready for the market till the beginning of next month.

Ingenuity is also displayed in the firm's inverted burner, which is a strong example of workmanship, and, to its good efficiency, adds other utilitarian features. In the first place, the burner can be fixed, without the use of any special adapter, to fittings with nosepieces either upright or depending. By a single twist of the curved tube of the burner, adaptability for the one or other form of fittings can be effected. The primary air inlets and regulator are quite away from the line of the products of combustion; being arranged (as seen in the illustrations) near the point of connection. There is a twofold advantage in this—that only pure air is admitted, and that regulation can, if necessary, take place without burning the fingers while the light is in use. An ingenious arrangement has also permitted the application of a bye-pass to these reversible burner tubes. This has been a difficulty; but it has been overcome in a manner that tests show to be effective.

In passing to a reference to the globe support, it is observed that the minimum of metal work comes within the line of the heat and products of combustion—merely the end of the burner-tube near the nozzle; and any deposition there may be on this is kept well away from view by the ring forming the support for the globe. This circular support is not in one continuous piece, but has a slot in each end; and by means of projecting pieces and a slide, it forms a spring band. The globe is held by screws in the ordinary manner; but when once they are set for the globe used, they need not be interfered with again, for, by pressing the projecting pieces on the spring band, it expands sufficiently for the removal or replacement of the globe. It will also be seen that this expanding spring support gives a good range to the user's preference as to type and size of globes.

JONES AND WELLMAN'S GAS-PURIFIER.

Mr. E. C. Jones, of San Francisco, and Mr. S. T. Wellman, of Cleveland (Ohio), have taken out a patent in the United States for the gas-purifier shown in the accompanying illustration, which, with the following particulars, is reproduced from the "Journal of the Society of Chemical Industry."



The gas to be purified enters the apparatus A through the pipe B; and after being mixed in the conical chamber C with vapours introduced through the pipes D and E, it is injected, along with the vapour, into the tube F, down which it passes—its progress being impeded by the spiral baffles G. The purified gas then flows upwards, as shown by the arrows, to the outlet H. Any condensed liquid runs away through the pipe I, which is sealed, as shown in the illustration.

Scottish Classes in "Gas Manufacture" and "Gas Fitting."

The results of the examination for the second year's course in "Gas Manufacture" at the Glasgow and West of Scotland Technical College of the students of Mr. Henry O'Connor are as follows: First prize and first-class certificate, George T. Purvis (Greenock Gas-Works); second prize and first-class certificate, Joseph G. M'Geachin (Dumbarton Gas-Works); second-class certificate, G. Davidson, J. Wilson, J. Barbour (Saltcoats Gas-Works), F. Cuthbert, T. Carmichael, and Ernest Unger. Examinations also took place at the Heriot-Watt College, Edinburgh, in the course in "Gas-Fitting," also held by Mr. O'Connor, with the following results: Medal and first-class certificate, W. Brown (Lasswade Gas-Works); first-class certificates, W. Gulland, W. Williamson (Leven Gas-Works), J. Morrison, D. Carfrae, and J. D. Bell; second-class certificate, W. Prentice.

Transactions of the Society of Engineers.—We have received the Transactions of this Society for the past year. It contains the full text of the papers read during the session (illustrated by a number of plates), reports of the discussions upon them, accounts of the vacation visits, notices of deceased members, and the annual report of the Council, with the statement of accounts. The useful general index is brought up to date; and the whole has been produced under the editorship of Mr. Perry F. Nursey, the Secretary.

NORTH IRELAND GAS MANAGERS' ASSOCIATION.

The Sixth Meeting of the Northern District of Ireland Gas Managers' Association was held at the Whiteside Temperance Hotel, Ballymena, on the 31st ult.—Mr. W. NISBET, the Gas Engineer to the Ballymena Urban District Council (the President), in the chair.

The PRESIDENT opened the business with a few remarks on the subject of main-laying. He said he had had to lay 1000 yards of main; and before deciding what kind of main to put down, he took into consideration the Mannesmann as against cast-iron pipes, and finally decided on the latter; the objections to steel mains being the thin metal, the special connections required, and the fact of the socket being tapered outwards, thus rendering the joints liable to be drawn. Mr. J. Nisbet, of Portadown, and Mr. Cummings, of Ballymoney, had also been considering steel mains, but for the same reasons had discarded them.

An interesting discussion followed, which was participated in by all the members present.

Mr. R. HARRISON (Monaghan) read the following paper:—

THE DEVELOPMENT OF THE MONAGHAN GAS-WORKS.

I had no intention of reading a paper to-day; but as our worthy President has asked me to start a discussion on some subject, I think that a short description of the progress made in our works at Monaghan might be the means of getting some other members to give their experience. At the present time it is very difficult to increase our sales, as we have so much to contend with in the shape of suction gas, electricity, acetylene, &c.; and I think any hints which the members could give in this direction would be useful and interesting.

Some years ago, the Directors of the Monaghan Gas-Works came to the conclusion that things were not going on quite satisfactorily, and that a change in the management was necessary. At that time the works were very far run down; the make of gas was about 5½ million cubic feet per annum, and at least 10 per cent. of the gas made was lost through leaky holders before it left the works, and most of the mains were in a bad state. However, a new Manager was appointed (I may say I was "in the running" at the time, but was not successful), and he began shortly afterwards to get things into better order. During the succeeding summer, a new gas-engine, exhauster, scrubber, washer, &c., were procured and erected, at a cost of about £400; and the following summer saw the Company in the market for a new gasholder with steel tank, which cost upwards of £1000.

Each year since has found the Company carrying out some improvements. One of the old gasholders has been cut out, and the tank made into a tar-well; while the other has been repaired and resheeted. New governors have been erected, and upwards of 80 per cent. of the mains have been relaid—the largest being 8 inches, and the smallest 3 inches in diameter, as I am of opinion that anything smaller than the latter is useless. Excepting the buildings, very little of the plant in use when my predecessor took charge is now in existence.

Though all the work done has been paid for out of revenue, neither the consumers nor the shareholders have suffered in any way. The price of gas has been reduced from 5s. 10d., with discounts up to 10 per cent., to 5s., with discounts up to 20 per cent.; and our shareholders are receiving a steady 7½ per cent. dividend. Ten years ago, our make was only 5½ millions; for the year ending the 1st of May last, we just topped 10 millions. I believe our output and price will compare favourably with those of any town of similar size and situation in Ireland. I am sorry that I have not been so successful with cookers as I should have liked. I held an exhibition a few years ago; but at the present I have only about a dozen-and-a-half of cookers on hire. As to gas-engines, when Mr. Nisbet came to Monaghan, there was not a single one in the town. Last year we sold more than 500,000 cubic feet of gas for engines.

No doubt you are aware that the District Asylum is a very large consumer of gas in our town, and, like other places, we have been continually kept in subjection with threats of electricity. This matter came to a crisis early this year, and the Governors engaged an expert to examine the buildings and report as to cost of the different modes of lighting. His estimate was: Coal gas, £476 6s. 6d.; electricity, £475 0s. 6d.; acetylene, £364 8s. As we did not intend giving in too easily, I appeared before the Board and disputed the figures submitted—offering to prove that coal gas was cheaper by one-half than any system of electric lighting; and I am glad to say I was successful in retaining their custom. We reduced the price of gas to 4s. per 1000 cubic feet for them; and we are to lay new pipes and provide a new meter at a cost of nearly £200. I am sure every member here will agree with me that a consumer using between £400 and £500 worth of gas is worth looking after.

A discussion took place on the points raised by Mr. Harrison; and the business concluded.

At St. John's Church, Croydon, last Thursday, the marriage was solemnized of Mr. James W. Helps, M.Inst.C.E., the Engineer and General Manager of the Croydon Gas Company, with Miss Mildred Jane Neall, younger daughter of the late Mr. John Sugden Neall and Mrs. Neall, of Addiscombe.

COLOUR PHENOMENA IN PHOTOMETRY.

At a recent Meeting of the Physical Society, a paper on the above subject was read by Mr. J. S. Dow. The author gave the result of experiments made at the Central Technical College with no other appliances than those of an ordinary photometrical bench. They can, therefore, be repeated in other laboratories. The following is an abstract of the paper.

The question has often been raised whether it is physiologically possible to compare lights of different colours. The author has found that it is chiefly a matter of practice. A great difficulty arises from the fact that the central part of the retina is more sensitive to red, and less sensitive to green, than the surrounding portion. Therefore, when we attempt to photometer lights of different colour, enormous differences are found as the distance of the eye from the photometer-screen is altered, and utterly divergent results are obtained with different photometers. Curves were given in the paper showing the effect of altering the distance of the eye when an incandescent mantle is compared against a gas standard with the Joly photometer. Differences of 5 per cent. can easily be obtained. An experiment was shown at the meeting to demonstrate that the Purkinje phenomenon, generally regarded as a great cause of uncertainty in ordinary work, only becomes noticeable at very small illuminations, and with comparatively large fields of view. The Purkinje effect can be physiologically explained by the action of the "rods" and "cones" upon the retina. The comparative weakness of the Purkinje effect with small fields can be explained by the fact that the central portion of the eye contains practically no rods, but only cones. The paper also described experiments to show that "Flicker" photometers seem to be affected by colour-phenomena, but to a smaller extent than ordinary ones. In any case, whether one of these or an ordinary photometer is adopted, it is necessary to specify the size of the field, the distance of the eye, and the order of illumination used, in order to get consistent results.

In the discussion which followed, Mr. A. P. Trotter expressed his interest in the paper, and said he thought the difficulty of comparing the intensities of two lights of different colours was an imaginary one. It was possible for anyone accustomed to photometric measurements to get reliable comparisons of lights of different colours. The author, for the sake of precision, had dealt with the comparison of red and green; but he pointed out that in practice the variation in colour between the lights under test was not so great as this—ranging from the light of the Hefner lamp to that of the arc light or daylight. He agreed with the author that, when taking photometrical measurements, it was best to get as far away as possible from the comparison disc.

Mr. A. Russell considered Mr. Dow's explanation of the phenomena of heterochrome photometry by means of the irregular distribution of rods and cones on the retina was quite satisfactory. Whatever theory was adopted as to the difference between the functions of the rods and cones, it was obvious that their relative numbers on the portion of the retina covered by the image of the photometer disc was a factor of primary importance in determining the balance. It was a physiological fact that there were no rods on the yellow spot; and this led Professor Blondel to suggest that if one so arranged that the image always fell on this spot, consistent results might be obtained. Reference was also made to M. Lauriol's paper in the "Bulletin" of the Société Internationale des Electriciens, on the effect of the speed of the rotating part of the "Flicker" photometer on the balance obtained. The experiments proved that many of the results secured depended merely on the speed of rotation. When comparing green with red, the numbers obtained varied between the wide limits of 1 to 5. Even when comparing a Nernst lamp with an ordinary glow lamp, a variation of 20 per cent. with speed was noticed. It was pointed out that it was easier to obtain a balance when comparing red with green by using a grease-spot photometer than by using a Lummer-Brodhun contrast photometer. The colours of the two sides of the grease-spot in the position of balance, owing to the transmitted light, were not pure red and green, but were mixtures which it was much easier to compare. The experience of the speaker was that the Lummer-Brodhun photometer was the one most favoured by those engaged in accurate photometrical work. For comparing lights of different colours, however, a modified form of the grease-spot photometer would have many advantages.

The Secretary to the Board of Agriculture and Fisheries sends a memoir of the Geological Survey on the water supply of Suffolk from underground sources. It consists of a general description of the geological features of the county, especially in connection with their water-bearing characters; general statistics of areas of formations; sections of borings for water and trial bores for other purposes; and analyses of waters from various parts of the county. The memoir, which is the outcome of the combined labours of Mr. W. Whitaker, F.R.S., Dr. H. Franklin Parsons, F.G.S., Dr. Hugh Robert Mill, and Dr. J. C. Thresh, contains 170 pages of letterpress, a map showing the average annual rainfall of Suffolk, and a complete bibliography of works relating to questions of water supply. We hope to notice it at greater length in an early issue. Copies may be obtained, price 3s. 6d., from the Ordnance Survey Office, Southampton.

THE PAST AND PRESENT OF THE HULL WORKS OF THE BRITISH GASLIGHT COMPANY.

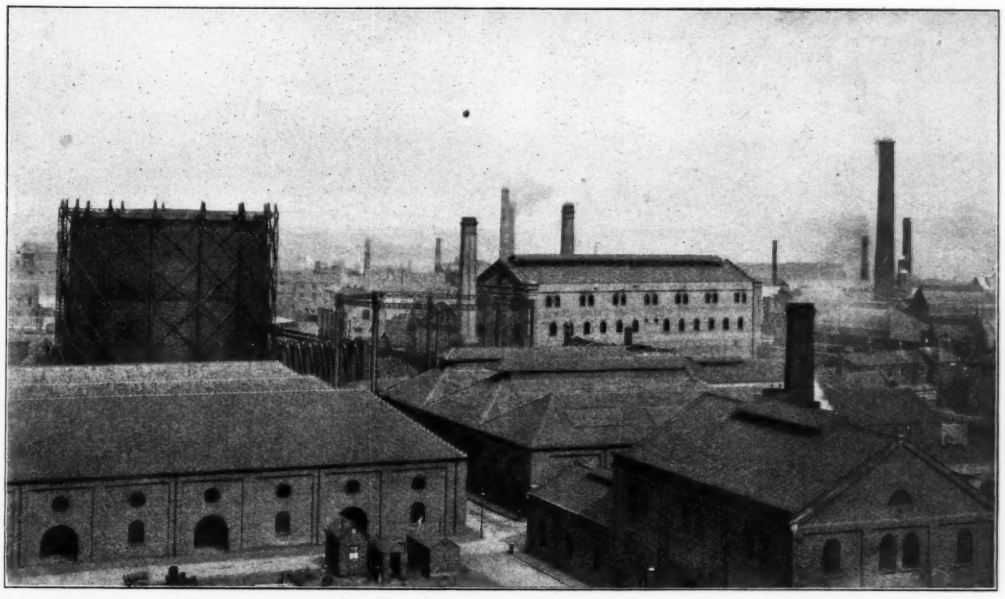
THERE have lately been described in the "JOURNAL" several new types of power-charging machines; and in this article it is proposed to deal with a works in which three methods are employed for charging and discharging the retorts, none of which are new in principle, but which embody some improved arrangements in the latest of the constructions.

Perhaps too much stress is at times laid on one principle when describing how economies have been effected; whereas the true examination of the matter should have regard to the trend of thought and action as seen in the treatment of all manufacturing operations, methods of distribution, and the means for utilization of the products. Of course, a keen lookout should be kept on retort-house labour; but, in doing this, attention need not be so focussed that the mind is fogged and blinded to other almost equally important factors. An expert engineer will have excellent machinery, and an efficient manager a well-organized system; and either or both may be humanitarian, or exhibit an æsthetic taste while building to satisfy and improve the outlook of the town's inhabitants. But let "the elements be so mixed in him" as to combine the chief of these qualities, it matters little what style of the approved types of machinery is employed in the retort-house, so long as it is in good hands. These few preliminary observations on retort-house labour are made, because a considerable portion of this article deals with a recent installation of inclined retorts, and not because we, or those responsible, wish to specially advocate any particular practice in charging, or endeavour to show that the adoption of a single principle has resulted in vast economies. Anything in the way of comparison between works is strictly tabooed in all these descriptive articles; and we now only try to show how a well-defined policy has been successful in maintaining and increasing a business, despite keen competition and great difficulties.

FROM EARLY AND PRESENT RECORDS.

The Sculcoates works of the British Gaslight Company at Hull are extremely well situated, having facilities for cheap intake of goods by both river and railway, being separated by roadway only from the River Hull, and having sidings on the Hull and Barnsley Railway. In this district, the Company own 42½ acres of land; and 21 acres of these are already covered by gas plant, leaving plenty of room for extensions, some of which are already contemplated.

The works are one of the oldest in existence devoted to gas-making; and it is extremely interesting to look through one of the preserved books recording the operations and showing the state of the industry in the district in and before 1829. Here are some hastily made extracts from a "Stocks and Averages" book. Taking the month ending July, 1829, it will be noticed that chaldrons were used instead of tons.



A General View of the Sculcoates (Hull) Works of the British Gaslight Company.

	Chal.	Bush.
COAL—In stock	9	30
Received since	4	0
	13	30
Used in month	12	34
Stock at date		32

In comparison with this state of things, it may be noted that the present stores will hold over 11,000 tons of coal; and when No. 2 store is built they will be capable of containing upwards of 10,000 chaldrons of 25½ cwt. each. Again turning to the record for July, 1829, it is seen that the gas account stood as follows:—

	Cub. Ft.
GAS—In stock	36,861
Made in month	92,119
	128,980
Used in month	115,876
In stock	13,104

What a contrast with the state of affairs now! The present make is over 100 million cubic feet per month; while the plant is equal to 180 million cubic feet per month. The storage capacity is equal to 7 million cubic feet.

Again looking at the entries for July, 1829, the following is the state of the residuals accounts:—

Breeze	½ bushel.
Lime	3 chal. 33 bush.
Tar	2784 gallons.
Liquor	2845 gallons.

The liquor was valued at ½d. per gallon; but it is noticed that at this time 284 gallons were given to "H.B." whoever that gentleman may have been; and when the stock rose in March, 1830, to 8866 gallons, 7866 gallons were run into the river. After this, every two months a further 2000 gallons were likewise disposed of!

As to the public lights these then only numbered 246; and were used merely in the winter months. The state of the revenue for gas was to June, 1830, as follows:—

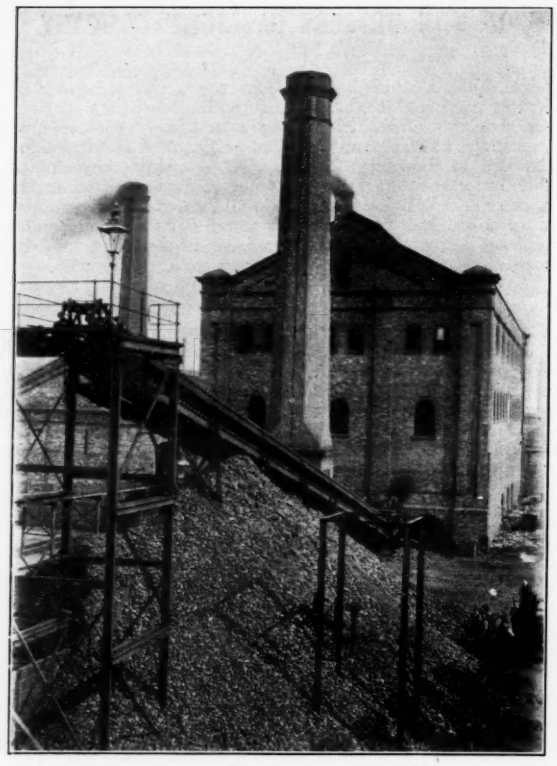
Public lamps	£878 9 6
Sold to public	1052 16 8
Total annual sale	£1931 6 2

NEW RETORT-HOUSE SCHEMES AND THEIR ADOPTION.

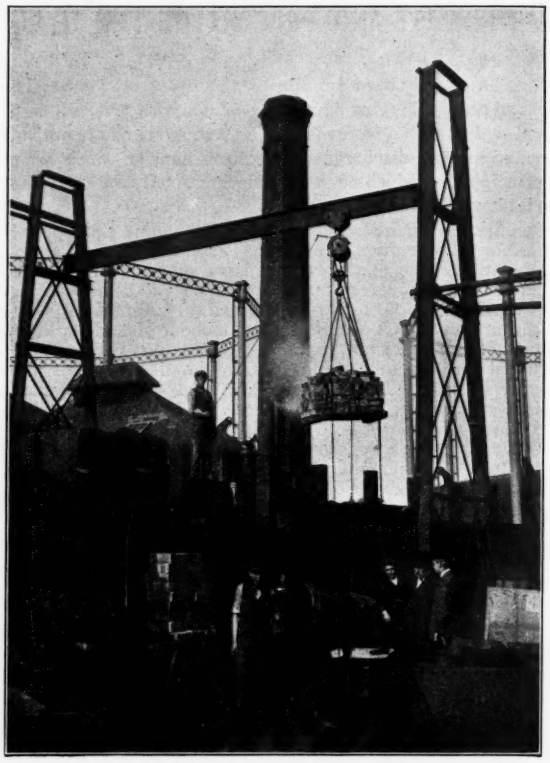
The history of the undertaking has been one of uninterrupted progress. When the present Engineer (Mr. John Young) entered the service of the Company in 1873, the output of gas at these works was 200 millions per annum, whereas the amount looked forward to in the present year is 1200 millions. We ought not to omit mention, in an article of this kind, of the long service and great work of Mr. Andrew Dougall, who was Mr. Young's predecessor (1875-1901) in the office of Chief Engineer at Hull.

In 1903, there were four retort-houses, one (No. 4) consisting of twenty beds of retorts, regenerative furnaces, served by Arrol-Foulis machines; No. 3 containing twenty beds of sevens, direct-fired and hand-charged; and Nos. 1 and 2 houses each contained fourteen beds of sevens, 21 in. by 16 in. by 18 ft., direct-fired and hand-charged. In the year named (1903), the hand-fired Nos. 1 and 2 benches, together with the buildings, were completely worn out; and they have since been dismantled.

As increased carbonizing plant was required, Mr. Young, after full consideration, decided on the immediate adoption of two benches of inclined retorts, with automatically operated coal-stores. After the acceptance of his proposals by the Directors,



The New No. 1 Retort-House, and Coke-Conveyor.



Showing Method of Unloading Materials.

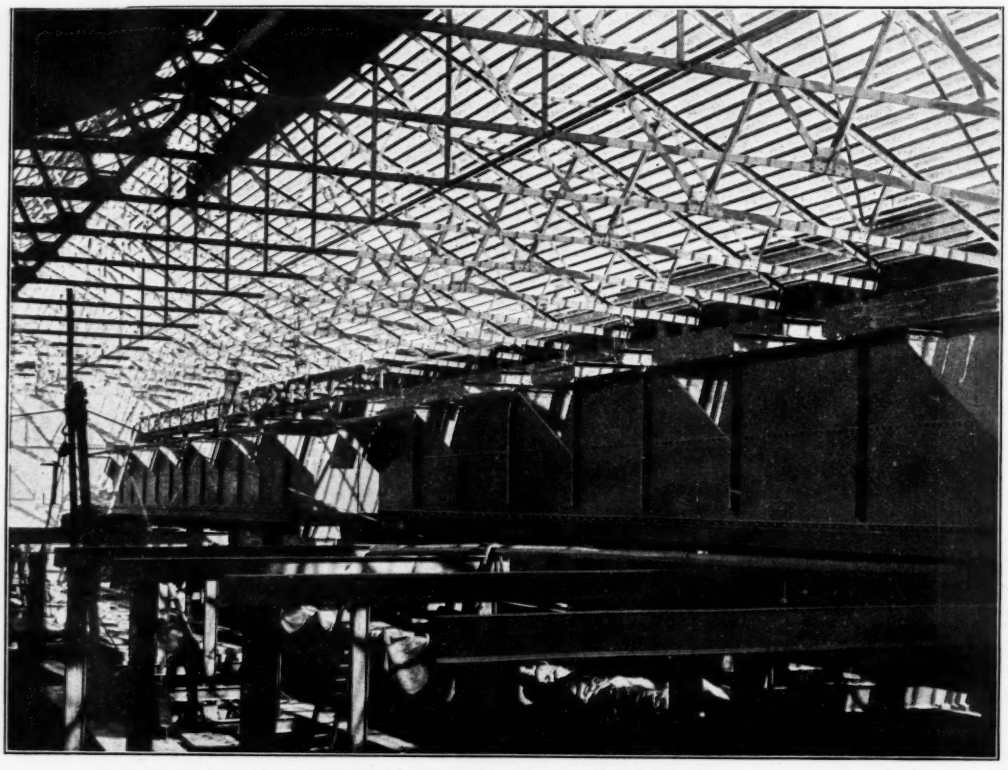
(Temporary Crane Structure now forms Part of the Coke Conveyor Supports.)

plans were immediately prepared, and a start made; the contract for the building for the first (No. 1) house being placed with Mr. T. Goates, a local builder, who also put in all the foundations and erected the chimney. The complete proposal embodied two new houses, with adjoining coal-stores, each comprising twelve beds of eight retorts. One house has been erected at present; and it is hoped the second will be shortly proceeded with.

The carrying out of the first section we shall deal with in detail, as difficulties were overcome which, in the describing, will prove of interest, and the methods employed instructive.

Erection of the First House and Details of Plant.

In March, 1904, the contract was placed for the erection of the new retort-house, to contain two benches of six settings each, and work was immediately commenced. The end of the retort-house, as designed, abutted on a narrow road separating the works from the coal-jetty on the River Hull. The Corporation of Hull then approached the Company with a view to widening this road; and considerable delay was caused pending negotiations—it being eventually decided to set back the house 8 feet, thus greatly



Simultaneous Construction of Benchwork and Roof.

improving the thoroughfare, and also the approach to the main entrance of the works.

The retort-house measures 170 ft. 3 in. by 55 ft. wide, and has walls 2 ft. 3 in. thick at the bottom. The general design is clearly shown in the accompanying photograph. The cost for walls, foundations for same and for the bench (average 5 feet thick), roof and slating, works out at 1·402d. per cubic foot, as compared with 1·71d. for similar work on the houses built for the horizontal retorts. The roof was erected by Messrs. C. & W. Walker, Limited, to the Gas Engineer's designs; and the wall plate is 54 feet above ground level.

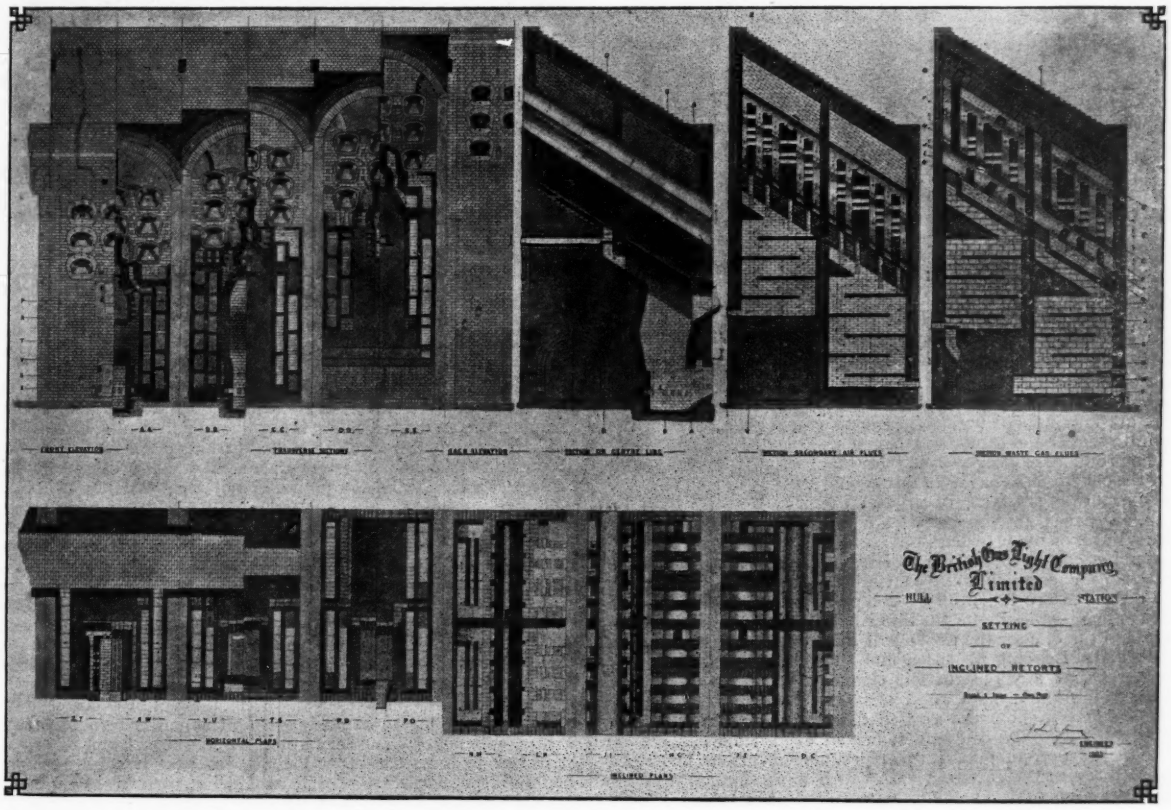
By March 26, the ground for one house was quite cleared; but, owing to a proposed alteration in the site, it was not until April 13 that a start was made on the walls. From this date, the progress was very satisfactory.

Simultaneously with the erection of the house, the concrete foundation for the retort-bench was proceeded with; and as soon as this was completed, the Contractors for the erection of the bench—the New Conveyor Company, Limited—commenced their work. As the roof could not be covered in for some time, it was arranged to erect the whole of the bench-ironwork first, and to build in the fire-brick work afterwards. The walls of the house were finished; and the first principal erected on Aug. 1. Cast-iron pockets had been built into the concrete, to receive and protect the foundation ends of the buckstays; and the whole of the superstructure—including buckstays, cross-ties, floor-joists, and bunker girders—was rapidly got into position.

One of the difficulties encountered at this time was that there were three contractors at work, all pushing on their own portion. The space being limited, it reflects great credit upon them that the work was carried on without any hitch or accident. The transit of materials and methods of construction were arranged so that each contractor was able to go steadily forward without being hindered. To effect this, the house itself was built entirely from the outside—thus leaving the interior free for the retort-house contractors to erect the bench ironwork. As soon as this was in position, the roof contractors used it as a base upon which to build and erect the roof, during which time (suitable temporary covering being provided) the retort-setters made a start, and built the main piers and arches.

The whole of the bench ironwork, weighing about 148 tons, was delivered by May 31; the sections being 16 in. by 6 in. by 64 lbs. buckstays, 12 in. by 6 in. cross-joists, and 6 in. by 5 in. floor-girders.

The two benches are set in one line, with a staircase between from drawing to charging stage; and each comprises 48 retorts 20 feet long in six arches, with division walls 1 ft. 10½ in. thick; 12 ft. pitch, and end buttresses 3 ft. thick. The retorts are of tapered section, 20 in. by 15 in. at the top, and 24 in. by 15 in. at the bottom, set on an incline of 32°, and measuring 17 ft. 2 in. horizontally.



Details of the New Inclined Retort-Settings.

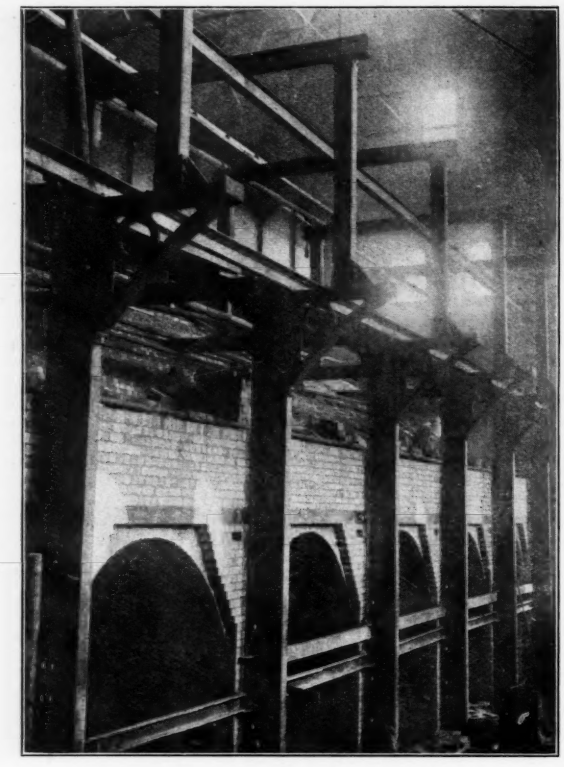
A few words as to the system of handling the building materials will be serviceable here. Hydraulic cranes command barges on the River Hull; and these were used for handling bricks and like materials obtained locally. Special receptacles to hold a quantity of bricks were raised and placed in position on carts, which drew the load round to temporary power hoists, placed in suitable positions from time to time. The receptacles were transferred to travelling bogies, designed by the contractors; and these were so carried on railroads that every part of the erection could be quickly reached. In addition to the facilities afforded by the river transit, others were obtained from the railway siding—about 130 yards distant from the site of the new house—alongside a vacant piece of ground which was used as a store for surplus material. Spanning the line of rails, a temporary travelling crane was erected, which unloaded the ironwork and retorts in slings and boxes, which were transferred to trolleys, and hauled thence by horse to a second power hoist, which likewise commanded the overhead tracks previously mentioned, and which were attached to the superstructure. In this way, the different erector's gangs were kept out of each other's way.

The Retort-Benches and Fittings.

Having outlined the erecting arrangements, we have to deal with the bench and fittings, and the disposition of the same in relation to the concomitant parts of the carbonizing plant. On the charging side has been built a coal-store, with unique transporting and unloading machinery (which will be described in detail). Contrary to the usual practice, the future extension will be built parallel with the one just erected, so that the drawing-stages will adjoin, but be separated by the wall of the house; and the coal-store for this extension will occupy a similar relative position with the retort-house, to the one now built. There are many advantages to be derived from this scheme, no less on the coke storing and handling than on the coal supply plants. But care must be taken with the ventilation of the houses; and in this case the Engineer has devised very efficient means for immediately clearing the atmosphere, without getting any keen currents of air on the face of the bench.

During the building of the bench, the Engineer had sketches made, from which a drawing was subsequently prepared; and we are fortunate in being able to reproduce this. Without hesitation it may be stated that it is one of the most perfect ever put on paper. It is the work throughout of Mr. A. Dougall, nephew of the late Mr. Andrew Dougall.

The height to the top of the bench is 25 ft. 2 in. on the low side, and 33 ft. 8 in. on the upper side. Special springer blocks are used to turn the arch, which has a radius of 5 ft. 9 in., and a rise of 3 ft., formed of 9-inch firebrick headers, covered with two rows of 4½-inch stock bricks, and the spandrils similarly filled.



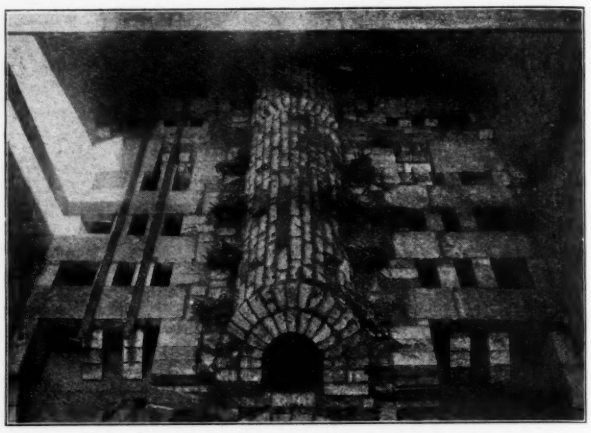
The Retort Arches and Bench Ironwork.

The main flue is built into the piers, and runs the whole length of the two benches, passing through the retort-house end wall to couple up to the chimney placed outside the gable end. It is lined with a 4½-inch floor, 9-inch side walls, two rows of 4½-inch arch bricks built to a semi-circle with a 2 ft. 6 in. radius, so that the flue measures 5 ft. wide by 5 ft. 6 in. deep. From each bed, there are four outlets, with dampers to control the heat for the separate sections of the settings.

The producer is pear-shaped, with contracted bottom to support the coke, and has a Gothic arch, built entirely of silica bricks, and measuring 3 ft. wide, about 10 ft. 8 in. high and 4 ft. 7½ in. deep. The charging-frame has double doors, is built into the vertical wall of the producer, but has the face set on an angle so as the better to receive the fuel from the retorts. The silica arch is 9 inches thick, built on the same angle as the retorts; and the gases are taken off at two points, each controlled by a silica damper—the one for the lower half being over the charging-door, and the one for the upper half being worked from the back of the bed. Leading to it is a flue 1 ft. 6 in. deep, built on the slope, so that any obstruction cleared out of the flues falls naturally into the generator. The two sections are built entirely of silica bricks, and measure 1 ft. deep by 1 ft. wide, each provided with eight graded outlets, which experience has proved give off the correct quantities of gas, at the various levels, for combining with the secondary air, which is discharged into the combustion chamber at points between the gas nostrils. Above the silica arch is a silica wall continuous throughout the width of the bed, which forms the support for a large continuous block, on which the centre retort rests; and on a level with the top of the gas arch are the side bottom retorts, which have protecting silica shields. Up to the centre of the silica block, the supporting cross-walls for the retorts are built; and these measure 9 inches wide, except round the joints of the retorts, where they are increased to 1 ft. 6 in. The retorts are set in three rows—two in the vertical centre line, and three on each side, 3 feet from centre to centre, and 2 ft. 0¾ in. from centre to the inside of the main pier.

The primary air, slightly heated, is admitted to the under side of the fire-bars by separate passages, built on each side of the clinkering-door, and with outlets on each side and at the back; a cast-iron frame being built in front of the back passage, to protect the brickwork when the fire-bars are butted against it, during clinkering operations.

The regenerator portion of each bed is divided into four sections, each controlled by a damper; and it is of zig-zag type, in which the secondary-air passage adjoins the producer, and is separated from the waste gas by a 4½-inch wall, built with blocks rebated at every joint. In the passage, horizontal tiles are laid, to form a series of divisions, with connecting-holes at alternate ends in each tier, so that the air entering is conducted backwards and forwards while constantly rising. The waste-gas flues are similarly constructed; but the gases travel in a reverse direction. To protect the main piers, a lining is built in the gas-flue; and this is securely held in position by special patent tiles.



Regenerators and Benches.

Combustion Arch, Gas and Air Nostrils, and Outgoing Flues for gases under Retorts. Iron Strips in Position for Sliding Down the Retorts.

Before leaving the brickwork, it may be said that all the fire-clay bricks and specials were of the best quality, and obtained from Yorkshire; and the silica goods in the producer arch were supplied by the Silica Fire-Brick Company, of Oughtibridge. This quality of material has stood some very severe tests on similar settings, which have been working at high heats (up to 2500° Fahr.) through five winters. The tests made in a large number of settings led to the retorts used being obtained from Stourbridge; the makers being Messrs. Mobberley and Perry. In this setting, the greatest heat is under 2200°, as this is sufficient to heat equally all the retorts to burn off 7 cwt. in six-hour charges.

In some places, where unequal heats are put on the retorts, engineers have to work with a high heat in the combustion chamber and an extra draught in the flue to pull the heat round the top and bottom corner retorts. But in such cases trouble invariably results through excessive heats on the supporting walls and centre retorts. In the setting under notice, the dampers to the main flue are kept open ¾ inch only and the width is 9 inches.

On Sept. 27 the bottom retorts and combustion chambers were finished. No time was now lost in getting the rest of the retorts set; and by Oct. 13 the front walls were built up, and the retort faces prepared for the mouthpieces. The faces of the retorts on both ends are kept 1½ inches back from the face of the brickwork, in order that a proper joint can be made with "Holtite" cement, and to present an even surface for the mouthpiece stays. Slow fires were put in the beds 104 days after the laying of the first brick.

Mr. Young does not set up any claim for getting the work done rapidly, or making the speedy erection a matter of comparison with American or other examples, as his aim, from the start, has been to have the plant built in the best possible fashion; and an inspection of the result cannot fail to impress engineers

No. 1 Bench in Work, showing Shield Plates Removed for Charging the Furnaces.

who are fortunate enough to be able to visit the Sculcoates Gas-Works. By Oct. 13, all the buckstays were erected and set, the floor-joists bolted in position, and the cast-iron floors laid down. The whole of the furnace and charging fittings were built in, and the water supply laid on.

The elevator-pit was not taken in hand till late, owing to the scaffolding of the house being in the way; but by Oct. 13 the elevator was erected, the two push-plate conveyors were in position, and the two overhead hoppers were finished, with the measuring-chambers, levers, &c., attached ready for working.

It may be mentioned here that the arrangement of tar take-off pipes successfully adopted at Hanley, and subsequently at Hull, on the horizontal retort-beds, has been extended in this new inclined retort house. The foul main is placed somewhat higher than the hydraulic main; and the gas only is taken out at a 10-inch by 14-inch valve. Four inches is the minimum clearance between the end of a dip-pipe and the bottom plate of the hydraulic main, which slopes to the centre; and at a point adjacent to this, between two of the dip-pipes, is placed the tar take-off, which permanently fixes the seal, and the weir-valve consequently does not come into use. The object is to ensure all tar and excess liquor being taken off as made, leaving 1½ inches of liquor seal on all the dips, and getting the gas away without contact with the cooling tar. The system tends to the preservation of the illuminating power. It is effected by placing a 2-inch vertical pipe in the hydraulic main, with the upper end carried to within a few inches of the top, and left open, and the lower end taken to within 1 inch of the floor of the main at the lowest point. A straight pipe connects to this at right angles, and is carried through beyond and below the foul main, with a plug at the end for cleaning purposes. This cross-pipe passes through the back plate of the main, and is fixed to give a 1½-inch dip. From the 2-inch connections, liquor and tar are taken to a pipe, which is sealed in a pot at the end of the bench, from which the tar and liquor can at all times be observed flowing to the separator. No attention is required by the arrangement, except an occasional inspection of the 2-inch connection, which can be easily cleaned if necessary.

(To be concluded.)

DEPRECIATION OF COAL STORED IN THE OPEN.

A recent number of the "Journal für Gasbeleuchtung" contains an article by Dr. H. Wolffram upon the manner in which coal deteriorates when kept in store unprotected from the weather for any length of time. The article opens with a review of the researches and opinions of previous investigators into the subject, and then proceeds to describe the results obtained at the Königsberg Gas-Works during the past two working years, when the material carbonized was nearly always one well-known brand of English gas coal.

A new gas-works to serve the town of Königsberg was brought into operation in July, 1902, and it was not provided with any covered coal-store till a few months ago. Soon after the plant was started, it began to be evident that the make of gas was lower than at the old works, where the same coal was used, but where a well-protected store was available to hold the coal as it was delivered from the ships. This deficiency was still more marked in the case of the tar and liquor, in spite of the fact that the new plant was more perfect, allowing a higher retort temperature to be obtained, and having mechanical charging apparatus for the retorts. The average annual make was certainly higher during the second year (1904-5) of running the new plant than during the first, although, on an average, the coal was wetter, owing to worse weather and more snow in the winter, as the annexed figures show. In 1903-4, the lowest amount of moisture in the coal—*i.e.*, the amount present when delivered—was 1·25 per cent.; the highest, 9·13 per cent.; and the mean, 4·16 per cent. In 1904-5, the corresponding figures were 1·47 per cent., 11·06 per cent., and 4·63 per cent. The average annual make of true coal gas (the make of water gas being deducted) was 28·30 cubic metres* per 100 kilogrammes of dry coal in 1903-4, and 29·29 cubic metres in 1904-5. The higher make per unit of coal during the second working year is explained by Wolffram as at least partly due to the fact that the average charge of each retort was about 10 per cent. smaller than in the previous twelve months, which enabled pyrometers to be used; so that loss of heat through introducing water gas containing an excess of undecomposed water vapour into the coal-gas retorts, was avoided.

The depreciation which the coal underwent during storage is, however, brought to light very clearly by the single works figures. For instance, a load of coal delivered on Aug. 15, 1904, gave a gas yield of 30·30 cubic metres per 100 kilogrammes when carbonized immediately after the ship arrived; after remaining in store till Nov. 20, it contained 5·86 per cent. of moisture, and gave 30·14 cubic metres of gas per 100 kilogrammes; while, after remaining in the unprotected store till March 12, 1905, it contained 5·63 per cent. of moisture, and yielded only 27·67 cubic metres per 100 kilogrammes. [In each case these figures for the make are calculated upon the weight of dry coal carbonized.]

The weight of tar produced per unit weight of coal carbonized was 0·06 per cent. higher during the second working year of the new Königsberg Gas-Works; but it contained considerably less of the more fluid and more valuable constituents, having an excess of the heavier portion, in comparison with that of the first year. The deficiency of the lighter and more valuable portion is doubtless due to the loss of volatile and gas-forming constituents from the coal as it remained exposed to the weather, more especially during the damp autumn. Summer rains run off coal, and the residual moisture is quickly evaporated; but in winter evaporation is less rapid, and so the water soaks in. Much snow fell in Königsberg during the winter of 1904-5—melting and freezing again repeatedly before it finally disappeared; so that the coal had every opportunity to become saturated with moisture.

Further details as to the loss in gas-making power of the same brand of English coal, delivered in 1904 on the dates mentioned in the first six horizontal lines, are given in the following table, which also indicates the very serious loss of ammonia suffered during storage. The figures representing the make are, as before, cubic metres of true coal gas per 100 kilogrammes of dry coal; while those of the ammonia are grammes of ammonia—firstly per 100 cubic metres of the true coal gas, and secondly per 100 kilogrammes of dry coal. The ammonia was determined in samples of gas drawn from the foul main before its exit from the retort-house. The first six horizontal lines of the table are the results of testing the coal immediately on arrival by ship on the dates named; subsequent lines refer to the same coal kept in the uncovered store till the dates stated in the first column.

	Moisture. Per Cent.	Make of Gas.	Ammonia in Gas.	Ammonia in Coal.
Fresh Coal.				
5/8/04	2·05	30·17	723	218
9/8/04	2·39	31·47	716	225
15/8/04	2·09	29·25	750	219
23/8/04	2·69	29·20	779	227
29/8/04	2·19	31·22	686	214
28/10/04	2·16	29·60	744	220
Stored Coal.				
1/11/04	4·00	30·47	717	218
11/11/04	5·62	28·97	716	207
22/11/04	6·04	29·90	703	210
20/12/04	6·21	28·87	586	169
7/1/05	5·48	27·88	505	138
25/1/05	5·80	26·64	414	110
3/2/05	9·18	26·33	423	111
16/2/05	5·98	27·35	384	105
3/3/05	7·07	27·45	360	99
13/3/05	4·38	27·28	383	104

* One cubic metre per 100 kilogrammes is approximately equivalent to 358·8 cubic feet per ton.

Fertilizers in Spain.

H.M. Consul-General at Bilbao (Mr. C. G. Wood) reports that, in connection with agriculture, the use of artificial dressings has considerably augmented, more especially in Castile and Navarre. Superphosphates, phosphoric slag, salts of potash, nitrate of soda, and sulphate of ammonia are most in demand. As a consequence, the manufacture and importation of chemical products for agricultural uses are daily increasing. It is stated that a large tract of land in the vicinity of the Rivers Cadagua and Nervion is about to be acquired by the Sociedad General de Industria y Comercio for the establishment of works for the production chiefly of sulphuric acid and superphosphates. To meet the quantities now required, large consignments of the latter are imported from abroad. Sulphate of ammonia is produced in Bilbao only by the iron-works, and part of it is purchased by the dynamite works for the production of nitrate of ammonia. The remainder is exported.

Gas for China Firing.

In the "JOURNAL" a few weeks ago, it was stated that the Longton Gas and Electricity Committee had empowered the Manager (Mr. W. Langford) to fit up a small experimental kiln, in order to demonstrate to manufacturers what can be done in colour firing with coal gas; the price of gas used for this purpose being at the same time reduced to the rate charged for motive power. Experiments which are now being carried out under Mr. Langford's direction are being attended with very gratifying success; and we learn that manufacturers have shown great interest in the enterprise. They have lent valuable assistance by contributing ware on which they desire to test the process in relation to special colours; and the results have induced several of them to place orders for the kiln, which is one supplied by Messrs. Fletcher, Russell, and Co. The kiln has satisfied some of the most critical as to its possibilities. One of the advantages is that, by the use of a pyrometer, manufacturers can ascertain the heat required for firing certain colours, and thus have a really definite guide. Moreover, there is a great saving of time in firing.

THE "READINESS-TO-SERVE" SYSTEM OF CHARGING FOR GAS IN AMERICA.

In the last issue of the "JOURNAL," we gave the paper on the above subject read by Mr. W. B. Tuttle at the recent meeting of the Ohio Gaslight Association. It elicited some interesting remarks from several of the members, in the course of which Mr. Irvin Butterworth, the President and General Manager of the Grand Rapids (Mich.) Gas Company, produced a circular he had issued to the consumers of his Company, which it was thought might be incorporated in the report of the proceedings.

The first speaker was Mr. Gardiner, who said he thought a clearer understanding of the effect of the new system might be arrived at by taking up first the question of costs as they occur in the gas business. In former days, it seemed to be considered that costs were essentially proportional solely to the output; and, as an instance, they had the old word "consumer," which it seemed to him was a very fallacious term. It implied that the customer's principal relation to the Company was dependent upon his consumption of gas. As a matter of fact, from a very extended analysis he had made of the costs of conducting the gas business, he was forced to the conclusion that the supply of a given quantity of gas was the smaller of the total costs; so that a man's consumption was really to his (the speaker's) mind the lesser factor of his relation to the company. For this and other reasons, he preferred the term "customer" to that of "consumer." In the cost of supplying gas, Mr. Doherty, who first developed the "readiness to serve" method, had in his rate sought, in a "customer" charge and a "demand" charge, to ascertain and assess individually and collectively from the customers of a company under existing conditions what might be called fixed operating expenses and charges not varying with sales. Having freed the sales from these charges, he had established a base-line of output cost and return. For this line he charged on the total of his average prices on the old system a uniform rate by meter of (say) $1·20 per 1000 cubic feet. Having freed the output cost of the fixed expenses and charges, he was then able to sell his entire output at (say) 70 c. He explained that he was using entirely arbitrary figures. In this way he got a constant fixed apportionment and a true changeable apportionment that varied with the actual gas consumption—the actual sales—and in which the net profits or net losses were directly proportional to the quantity of sales.

In analyzing the cost of gas, Mr. Doherty seemed to have taken a customer cost in which he had included the total cost of handling the customers' accounts, collection expenses, &c. He appeared to have apportioned this amount by averaging it among all his customers, and arriving at a cost of $1 per customer per month. He treated his demand costs in the same way; apportioning his fixed charges on an average of so much per 100 cubic feet of hourly maximum rate demand, and then taking his output costs and treating them in essentially the same manner. An understanding of this rate threw a great deal of light upon other rates. It was a system which he (Mr. Gardiner) used to work out and analyze the accounts and to correct the errors and fallacies of other rates. He was absolutely opposed to charging a uniform rate by meter, from a cost point of view. It seemed to him the only considerations gas managers should give to the uniform rate by meter, were two. First, they must remember that the public liked it—a very important matter; and, secondly, they should regard it as the means they should use to show the public that the uniform rate by meter was not to their best interests. It was exactly like a railroad company where the company were obliged to carry all freight at a rate of 1 c. per ton per mile. This would be a very nice rate for the man who wanted to transport fancy prints, silks, diamonds, bullion, or anything of that kind; but it would be a prohibitive rate for one who wanted to transport wheat, coal, or ore, especially on long runs. If they would compare the railroad business of America with that, for instance, of Prussia, where the railroads were owned and operated by the Government, they would find that in America the average railroad rates were very much below those of Prussia. The reason of this was that in America they had in their railroad rates very wide differential rates. The lower grade freights were carried at practically cost price; and a very large volume of business with very small profits per unit was built up thereby. The railroads consequently served the community to a much greater extent and at a much lower average price in America than in other countries. Let them apply this to the gas business. Of course, the community were primarily hit by the uniform rate by meter system; and, secondarily, it worked very much against the development of the gas business. Personally, he was very far from being satisfied with the Doherty rate; but it seemed to him that it was the most equitable, logical, and most easily extended rate that had yet been formulated. Entirely apart from the many intricacies of the rate systems, the "readiness to serve" method appealed to him as the best means at hand of reducing the price of gas. Assuming a gas company, selling on a uniform rate by meter at $1·25 per 1000 cubic feet, with, as might as well be the case, half the customers unprofitable. If they could reduce the price to an average of $1·10 per 1000 cubic feet, they might do so by a horizontal reduction to all, and thereby increase the proportion of those who did not pay their own way. It seemed to him that it would be more equitable to reduce the price only to those who paid more than their costs. This could be done by retaining the old flat-rate, and putting in a Doherty optional rate. Analysis should show to what extent the present customers would individually profit, and what would be the total amount of profit. The new rate would be so drawn that the amount would equal the reduction from $1·25 to $1·10 on the whole business.

Mr. Butterworth was the next speaker. He said they were now inaugurating in Grand Rapids a "readiness to serve" method of charging among all their customers. Upwards of 3000 of them were being arbitrarily placed on this method, because it was known by their accounts that they would be benefited financially by the change, and therefore would not object so long as they could save money by it. The Company had altogether about 22,000 customers. They were going to offer the method to the other 19,000; and he had with him the circular they were sending out, explaining the method to them. He should like to have it included in the minutes of the proceedings. They were offering a "readiness to serve" rate pure and simple, which was a customer's charge of $6 per annum per meter, and a demand charge of $24 per annum for each 100 cubic feet per hour maximum instantaneous demand, and 70 c. gross or 60 c. net per 1000 cubic feet for gas. Asked by the President (Mr. Donald M'Donald, of Louisville) if he found the new method of charging was being generally accepted, Mr. Butterworth said they thought it would be adopted by the 3000, and he believed it would be by many more. He then handed in the circular he had referred to.

MR. IRVIN BUTTERWORTH'S MEMORANDUM.

The cost of supplying gas to a consumer is by no means proportional to the quantity which he uses. It costs much more per 1000 cubic feet to supply some consumers than to supply others—in fact, the cost varies with practically each consumer. For instance, let us take two consumers, A and B, each of whom, we will say, burns 50,000 cubic feet of gas in a year. A burns a little gas every night, a little every morning, and generally a little about noon each day, thus dividing his consumption quite evenly throughout the day and the year; while B, on the other hand, burns gas only in the evening and during only a few evenings in the year, although he then burns it quite freely. It is obvious that, in order to supply B with gas, it will be necessary for the company to provide a larger meter, a larger service-pipe, a larger street main from his premises clear to the gas-works, a larger gasholder, and a larger gas-works than are necessary in order to supply A. In other words, B entails a much greater investment upon the company than does A, though each consumes the same quantity of gas. It is not fair to A, therefore, that he should be required to pay as much per 1000 cubic feet for his gas as B should pay, if a flat price per 1000 feet is the only basis of charging.

Again, each consumer, whether he burns much gas or little, and regardless of the size of his meter, service, street-main, &c.—in other words, irrespective of the amount of his consumption and maximum demand—occasions us certain fixed expenses, such as the cost of reading his meter monthly, making up his bills and delivering them monthly, doing all clerical and office work and book-keeping incidental to keeping his account, looking after his meter and maintaining and repairing it, and sundry other expenses, all of which are proportional only to the number of consumers (counting each meter a consumer) on the company's books, and bear no relation whatever to his consumption. In fact, if there were no consumption at all, these expenses would continue practically the same, so long as the meter remained in the premises. It is obvious, therefore, that all consumers should pay the same "consumer's charge" per meter covering these expenses, and that under the usual "flat rate per 1000" method of charging for gas the small consumer pays less than his fair share of these expenses, while the large one pays more than his fair share.

Gas companies and the public generally have come to realize that, under the old method of charging, where all consumers pay only a flat price per 1000 cubic feet, some of them must necessarily pay less than their proportionate share of the company's expenses, and others more, and that the company's loss on those who pay less must necessarily be made up by those who are compelled to pay more.

An analysis of our consumers' accounts shows that we lose money on about 30 per cent. of the total number of our consumers, either because of their small consumption or of their large maximum demand in proportion to their total annual consumption; and this loss is necessarily made up by the remaining 70 per cent., who are thus paying more than would be required of them if an equitable method of charging were in force.

Now the "readiness to serve" method of charging overcomes all this unfairness and inequity. Under its complete operation, each consumer pays exactly in proportion to the costs entailed upon the company in serving him; so that no consumer pays more than his proportionate share of the company's expenses. We are therefore offering it to this community in the hope of bringing about more equitable conditions. This method is optional with each consumer; he being at liberty to either adopt it or remain under our present method, under which the price of gas will continue to be 90 c. net. If some of our consumers cannot advantageously adopt the new method at this time, it is because their consumption is very small, either actually or in proportion to their maximum demand, and also because our charges must for the time being remain high enough to enable us to carry the 30 per cent. of our consumers above referred to, who are a source of actual loss to us, as we do not want to increase the price which they are now paying.

In our desire to benefit the largest possible number of our consumers, however, we have fixed our charges under the new method so low that, based on last year's total gas consumption in Grand Rapids, our receipts for the ensuing year will suffer a reduction of about $40,000. Our inauguration of this rate, therefore, means a substantial reduction in the cost of gas to this community as a whole. If our consumers

shall take kindly to this new method of charging and increase their use of gas, as they can very cheaply do thereunder, further reductions under the new method will be made by us as soon as possible, until ultimately practically all our consumers will be enjoying the advantages of this method of charging, and the community as a whole will be paying a very low price for gas.

The new method is in vogue in several cities, and is pronounced by experts to be the most equitable and logical of all systems of charging for gas. As stated above, each consumer pays exactly in proportion to the cost of serving him; this cost differing with practically each one. Every gas bill under this method will be made up of three elements: (1) The consumer's charge, (2) the demand charge, and (3) the gas charge. The yearly consumer's charge is the same for each meter, because each meter entails the same cost upon the company, whether little or much gas, or even no gas at all, passes through it. The demand charge carries with each consumer, according to the amount of his demand for gas at the moment during the year when he burns it at the greatest rate. It covers the company's expenses in keeping the meter, service-pipe, street-main, gasholder, and gas-works large enough all the year round to meet this temporary maximum demand whenever it shall come, though the portion of the company's plant necessary to take care of this temporary demand may lie largely or wholly idle and unproductive during the remainder of the year.

For the present the size of the meter in use will be taken as the measure of this maximum demand. Each meter will be considered as having a capacity of 5 cubic feet of gas per hour per meter light, and the demand charge will therefore be $24 per annum per 100 cubic feet of the meter capacity. If the consumer has two or more meters supplied through one service-pipe, their total capacity will be the basis of the charge. Each consumer, after the foregoing charges have been paid, then pays the same uniform price for gas per 1000 cubic feet; this price being extremely low. It will be seen that, under this method of charging, all consumers are treated absolutely alike, there being no discrimination whatever; whereas the grossest discrimination is inherent in the old method.

The consumer's charge and the demand charge are yearly charges, though, for the sake of convenience and ease of payment, one-twelfth part of them is made payable with each month's gas bill, and as a part thereof. Therefore, though the premises of a consumer buying gas under this method may remain vacant during several months of the year and no gas be consumed during that time, these fixed charges continue and must be paid. Each consumer's year begins at the time that he adopts this method of buying gas.

Under the operation of the new method of charging, monthly gas bills will normally be more nearly uniform in size throughout the year than under the old method. Therefore all comparisons of bills under this method with those under the old method should be made upon a yearly, and not upon a monthly, basis. In cases where consumers can figure little or no actual saving by the adoption of the new method, based on the quantity of gas heretofore used by them, they should nevertheless bear in mind that if they should want to use more gas than heretofore, its cost to them will be extremely low, so that it would be to their advantage to adopt this method under such circumstances.

Mr. Low said he should like to ask Mr. Butterworth how the maximum demand for gas was arrived at. Taking, for instance, a gas-stove having seven or eight burners; how did they arrive at the maximum demand? Mr. Butterworth said simply by the size of the meter, which showed the maximum demand. For the present, this seemed to be the best method. Mr. Low said it might be of interest if he related a little incident. Last year the City Council decided that his Company were not doing business on business principles. They were making a demand charge for electricity of 12½ c. and a 5 c. running charge. But they could not figure it out. He made an experiment with reference to a planing-mill, principally because one of the councilmen happened to be engaged in this business; and he decided that the rate they were charging was quite right.

Mr. Forstall said that, as a matter of history, the subject of charges, based not entirely upon the quantities of gas consumed, was considered some time before Mr. Doherty took it up. It was treated in a paper read by Mr. Walton Clark, before the American Gaslight Association in 1891. He should like to ask Mr. Tuttle if he had any idea that he could get all his customers to accept $1·50 per month as the charge for 100 cubic feet maximum demand; and also to ask Mr. Butterworth if he thought he could get any considerable proportion of his 19,000 customers to accept $2 per month. He himself was inclined to think he would find it very difficult, and would not reach the people he was trying to reach. He (Mr. Forstall) had gone into this subject in a modified way in a very small town. He did not try to bribe the people at all; he made the rate, and if they wanted gas they had to take it at that rate. In the particular town there was not a very large maximum charge. For their own convenience, they had arrangements so that they could make all the gas they needed for 24 hours in about three hours; so that the maximum charge did not amount to very much. He made the customers' charge too low, as he started at 25 c. per month. There was no customer in the town who did not pay at least $2 a month. This year they were going to make a change in the price, so that anybody who burnt less than 3000 feet of gas in a year paid, under the new schedule, an increased rate, and those who burnt more than 3000 cubic feet had their gas for less. The customer who used over 3000 cubic feet had his gas at an average reduction of about 10 per cent. from the old price. The next time he made a change, he was going to put the price up a little higher to the man burning less than 3000 cubic feet per year, and keep on increasing it until he hoped to finally get rid of him. He did not think they could make a maximum charge of anything like the amount Mr. Tuttle and Mr. Butterworth figured, and impose it generally.

Mr. Butterworth pointed out that their demand charges were only $1 per month instead of $2, as Mr. Forstall had suggested. He added that they felt certain that a large portion of the 19,000 customers would be interested in the new rate. He estimated that 1000 would come in voluntarily in addition to the 3000 he had already referred to.

Mr. Lloyd said he should like to ask, if a uniform charge of 60 c. or 70 c. was made for gas to all customers, how the suppliers of gas were to secure and hold the engine business. For instance, supposing they found it would be profitable to sell gas for this purpose for 50 c. Mr. Tuttle had supposed a case where they had a customer who used gas for lighting which he figured out at $1·20 per 1000 cubic feet, and with the same man using the same quantity of gas for engine purposes he arrived at a like price. If the illustrations were reversed, might it not be possible that one would charge the lighting customers a very low rate for gas consumed at the time of maximum demand, and penalize the use of gas which would be principally employed in the earlier hours of the day when the plant was not taxed?

Replying to the remarks, Mr. Tuttle said as to Mr. Gardiner's statements, there were very few large companies who were not now making special rates for power and industrial purposes, and certainly none were getting much of this business who were not selling gas below the ordinary rate for which it was furnished to the small consumers. With regard to the question as to whether one could get all the customers to accept the new rate, he stated in his paper that he only expected to get a portion of them, and at first they had but a small portion. He only wanted to give the new rate to people entitled to it. If the others increased their demand so as to avail themselves of the rate, they would be entitled to it, and be permitted to enjoy it. They had taken all the different factors of cost into consideration. For instance, the big engine consumer had his gas at a very low rate, and the man who burnt only 1000 cubic feet at his house did not. In this way, they kept out those they did not want to get the benefit of the low rate, and secured those who were entitled to it. If they could afford to supply a gas-engine consumer at 50 c. per 1000 cubic feet, and take all the factors of cost into their consideration, then the "readiness to serve" rate must be below 50 c. With regard to the question as to whether or not they were acting detrimentally to certain people by not giving a better rate for engines, for instance, than they did for lighting, he would say that the loads were very apt to overlap, and actually did so in nearly every city in the winter. In December they did so in both the electric and the gas business. They certainly recognized in the electric lighting business that the power load lapped over the lighting load in the early evening hours.

OSCILLATION OF FLAME CONES.

Those of our readers who have followed the investigations of Professors Smithells and Lewes into the structure of flame, will doubtless be interested in some correspondence which has lately been going on in "Nature" on the subject of the oscillation of flame cones. It was commenced by Mr. Harold E. Temple, of Olton, Warwickshire, who asked for an explanation of certain flame phenomena produced while he was experimenting with a modification of the apparatus used by Professor Smithells for the separation of the cones of a bunsen flame. His letter was as follows.

A mixture of gas and air is burned at the top of a vertical tube (made preferably of combustion tubing) about 4 feet long and ⅝ to 1 inch in diameter, having a delicate screw adjustment for regulating the proportions of gas and air. The air supply is carefully and slowly increased, until an almost explosive mixture is reached, and the inner cone is very short and sharp and of a light green colour. On admitting a slight increase of air after this point, the inner cone (sometimes the two cones) descends the tube to a distance of about 2 feet, and then pauses and goes up, rejoining the outer cone. The flame then "sharpens" again and repeats the process, and will continue to do so for several hours without further adjustment of the gas or air being made.

There is every appearance of an explosion wave being propagated, as shown by the increasing velocity of the descending flame, and by the occasional emission of a note as it reaches the end of the travel. The length of travel can be regulated by the amount of air admitted, varying from 1 or 2 inches to about 2 feet in the same tube. If it be allowed to exceed a certain limit, the inner cone is extinguished at its lowest point, but immediately relights at the top of the tube, and then returns as before. The periodicity can be varied from about once in five seconds to once per second. The gas pressure does not need any special regulation; the ordinary variations from a town supply not affecting the results.

The following are the points requiring explanation: (1) As the proportions of gas and air are constant, what is the cause of the periodic "sharpening" of the cones after meeting at the top of the tube? (2) What prevents the explosion wave being completed, and the consequent firing-back of the mixture? (3) What causes the inner cone to return and travel up the tube, rejoining the outer one at the top? (4) The alteration in the character of the flame (in view of the fact that the proportions and pressure of gas and air are constant) points to some form of wave-motion bringing the molecules into closer contact. If this be so, what are the conditions which set up this wave motion, and what determines its periodicity?

In the same number of "Nature," Professor Smithells replied:

The phenomenon described is in part dealt within a paper by Dr. Ingle and myself in the Transactions of the Chemical Society for 1892. The continued oscillation of the inner cone is, I think, explained by the fact that the mixture of gas and air in the tube is not uniform. We have, indeed, found it necessary to use elaborate mixing appliances to make it uniform. When a portion of the mixture rich in air reaches the top of the tube the inner cone is propagated though it, and descends until it reaches a stratum richer in gas, when it reascends. The fluctuation in the composition of the gaseous mixture escaping from a bunsen burner can be seen by the throbbing of the inner cone, when the air supply is considerable. I may add that in the construction of burners for the incandescent mantle great importance is attached to the perfect mixing of gas and air, since it becomes possible thereby to have a steady flame with a relatively large quantity of primary air.

This letter was followed by one by Professor Galloway, of Cardiff, who wrote:

Like Professor Smithells, I have made many experiments with gas and air mixed by mechanical means and otherwise, but am unable to agree with his conclusions in this case.

Assuming the mixture ascending the tube to contain 20 per cent. of gas by volume, and the relative densities of the air and gas to be as 1 : 0·5, then the head which produces the current is equal to a column of air 4·8 inches (0·4 foot) high, and disregarding friction, the velocity $= \sqrt{2g\,0{\cdot}4} = 5$ feet per second.

Again, assuming the average absolute temperature of the gases above the flame, when the latter has descended to a depth of 2 feet, to be 1500° Fahr., and the corresponding temperature of the air entering the tube from below to be 520° Fahr., the head becomes 18 inches (1·5 feet) and the velocity $= \sqrt{2g\,1{\cdot}5} = 9{\cdot}8$ feet per second.

According to Mallard and Le Chatelier, the maximum velocity of translation of flame in a perfectly motionless mixture of lighting gas and air, contained in a glass tube of similar dimensions to that used by Mr. Temple, is 4 feet per second; but when the mixture is moving or agitated, the velocity of translation increases, and may even assume the form of an explosive wave. The maximum velocity of 4 feet per second was obtained when the mixture contained 17·5 per cent. of gas, or, according to the authors, 2·5 per cent. more than is necessary for complete combustion.

Variations in the velocity of the current on the one hand and of the flame on the other, appear to me to account for all the phenomena observed by Mr. Temple.

Professor Smithells closed the correspondence with the following letter.

Professor Galloway considers that my explanation of the phenomenon described by Mr. Temple is inadequate, and he offers a different explanation. With the view of deciding the question, some experiments have been made here [Leeds] by Mr. C. E. Whiteley. I may perhaps repeat that the phenomenon in question is the continued descent and reascent of the inner cone of a coal gas and air flame when a suitable mixture of the two is ignited at the end of a glass tube fixed so as to form a prolongation of the metal tube of a bunsen burner.

The following results were obtained by Mr. Whiteley: (1) The continued oscillation of the inner cone could not be established with a forced supply of both gas and air, but only when the air was sucked in by the injector action of a gas-jet, as in the ordinary bunsen burner. [Mr. Temple informs me that this was also his method of working.] (2) The continued oscillation of the inner cone could be maintained when the apparatus was tilted even to horizontality or beyond. (3) When the inner cone began to descend, a back-pressure was immediately produced in the ascending current of gas and air.

I think the determining influence is clear from these observations. When the cone begins to descend and causes back-pressure, this will momentarily check the in-draught of air without materially checking the supply of gas. A stratum of mixture containing less air is thus produced. Its rate of inflammation is less than its upward velocity, and so the cone is carried to the top of the tube. Soon the normal air supply is reestablished; a mixture with a higher rate of inflammation is restored, and the cone again descends. A confirmation of this explanation is afforded by two further observations: (4) A shortening of the glass tube increases the rapidity of oscillation in conformity with the shorter distance to be traversed by the altered stratum; (5) a "capacity" in the form of a globe at the bottom of the glass tube stops the oscillation. Such an arrangement would both damp the back-pressure impulse and obliterate stratification.

Observations (2) and (5) show, I think, that the chimney-like action suggested by Professor Galloway cannot be the determining cause; and, indeed, this could hardly be expected, inasmuch as such action would increase the aspiration of air, and produce a mixture having a higher rate of inflammation, a condition which would oppose the other effect—viz., the increased upward velocity of the mixture to which alone Professor Galloway alludes.

My own previous explanation was inadequate to explain the continued oscillation, and was only important in relation to the lighting-back of bunsen flames.

Belfast Gas Department Technical Guild.—The Belfast Gas Department Technical Guild (an organization recently formed for the provision of technical classes and lectures, a circulating library, &c.) have suggested the formation of special local "Gas Distribution" classes. The Principal of the Municipal Technical Institute (Mr. F. C. Forth) is heartily co-operating in the project; and a comprehensive syllabus of lectures is being prepared for the ensuing session. It may be remarked that the circulating library of the Technical Guild has received generous gifts of books from the heads of Corporation Departments and others, who are entirely in sympathy with the aims and policy of the guild.

LOCAL RUSTING OF IRON UNDER WATER.

The report of the Royal Testing Laboratory at Gross-Lichterfelde for the year 1904-05 (extracts from which have been printed in the "Journal für Gasbeleuchtung") contains a reference to the rusting of iron that takes place when the metal is submerged in water.

The corrosion is brought about simply by the oxygen dissolved in the water, for the oxygen which is combined with hydrogen in the water molecule plays no part in the process except when stray electric currents are present of sufficient voltage to induce electrolysis. Angles and projecting parts of the metal help to entangle air bubbles, and hence hasten rusting. Iron does not rust under the surface of air-free water, nor does it corrode when in contact with copper. If, however, air has access to it, the iron rusts more rapidly than usual, as the copper is electro-negative. Iron will not rust in a solution of common salt, such as the sea, provided air is absent. Materials, like wood charcoal powder, which absorb oxygen, protect iron from attack; and alkaline solutions—*e.g.*, caustic soda and sodium carbonate—which contain but little dissolved oxygen, are inert. Numerous solutions that do contain dissolved oxygen—*e.g.*, potassium cyanide—do not corrode iron. In a potassium cyanide solution copper is electro-positive to iron; probably the cyanide solution is positive towards the iron, so that the dissolved oxygen does not migrate to the iron, but remains in the liquid.

When large masses of iron rust under water, the consumption of oxygen is considerable; and therefore laboratory experiments, where a relatively large quantity of iron is kept in contact with a small amount of water, are apt to give more favourable results than those which are found in practical conditions. Experiments of the kind, too, are frequently valueless, because details are not afforded as to the manner in which the liquid may have been partially freed from air, through changes in temperature and the like. Though the inner surface of a gasholder stands in or over water with an atmosphere of coal gas above it, the plates are still liable to rust. The outer part of the seal dissolves oxygen from the air, the oxygen diffuses through to the interior and acts upon the metal (unless it is thoroughly painted) just as if no coal gas were present.

It is important to remember that two metals do not always occupy the same relative positions in the electro-motive series when immersed in different liquids. When two different metals, or two different varieties of the same metal, are in contact under a liquid, the dissolved oxygen migrates to the more positive metal, or the more positive variety, whichever it may be. When one particular sample of ingot iron plate was wholly immersed for 22 or 23 days in tap water at ordinary temperatures, the surface of the water being in contact with the atmosphere, the metal lost 0·08 gramme in weight; but when air was led through the water all the time, the loss in weight amounted to 0·19 gramme. When the experiments were repeated with the plate in contact with a piece of cast iron, the loss of the ingot plate was 0·04 gramme under the still water, and 0·14 gramme under the water when air was passed through it.

A further report upon this subject is promised, in which special attention will be devoted to the different behaviour of various metallic couples when immersed.

The Benevolent Fund of the Gas Institution.

The Committee of Management of the Benevolent Fund of the Institution of Gas Engineers will, on Wednesday of next week, present the following report for the year ended Dec. 31, 1905. The receipts have amounted to £301 9s. 8d.—subscriptions yielding £86 2s., donations £107 2s., interest £93 4s. 11d., and amount refunded on account of income-tax £15 0s. 9d. Included in the donations are the sums of £52 10s. received from Messrs. Bridges and Smith, the Organizing Managers of the International Gas Exhibition, and £50 from Mr. R. Hesketh Jones, of Croydon. The amount of £186 7s. has been disbursed in assistance to widows, orphans, and others. At the present time, the number of those receiving assistance from the fund is nine. Should a case of distress which the fund might assist be brought to the knowledge of any member of the Institution (whether a subscriber or not), the Committee will be glad to receive particulars without delay, so that steps may be taken to investigate with a view of relief being granted, if possible. The members of the Committee now about to retire in accordance with the rules are Mr. Thomas Berridge, of Leamington, and Mr. Charles Wood, of Bradford. For election as their successors the Committee have nominated Mr. W. Doig Gibb, of Newcastle-on-Tyne, and Mr. C. Meiklejohn, of Rugby.

A German scientist is reported to be the discoverer of a new gas which, it is claimed, will be superior to petrol, besides being cheaper. At present all heavy oil used in motors has to be gasified by heat; but the new gas is generated from tar oil and gasified by cold. Both as an illuminant and as providing the motive power for vehicles it is said to be superior to anything of the kind now in use. It is not easily inflammable, and is unaccompanied by smell or smoke. It is calculated that it can be produced 60 per cent. cheaper than petrol.

REGISTER OF PATENTS.

Gas-Engines.—Lake, H. H.; a communication from the American Rotary Engine Company, of Boston, U.S.A. No. 8796; April 26, 1905.

This invention has relation to gas-engines of the Otto cycle class, in which is employed a balancing arrangement constituted by two fly-wheels situated on opposite sides of the engine and revolving in opposite directions, and having a device for scavenging, reducing the compression space, and throttling the gas—consisting of a prolongation of the cylinder, in which is fitted a piston allowing of adjustment by means of suitable arrangements.

The invention has for its objects: First: To reduce the variable stresses experienced by the piston, the piston-rod, and the cylinder, as the relation between the parts varies during the rotation of the crank-shaft, and the consequent vibration "which has hitherto practically unfitted a gas-engine for use on relatively delicate mechanisms or machines, as motor-carriages, and the like." Second: To provide a gas-engine of the type mentioned with means whereby it may be changed to increase or reduce its power without varying the degree of compression of the explosive mixture. Third: To equip an engine of the character last referred to with means for automatically regulating the operation of the inlet valve in accordance with the power developed by the engine. Fourth: To provide loose connections between the piston-rods or pitmen and the piston to compensate for expansion, which causes variations and inequalities in the length of the pitmen, and to prevent the piston from binding in the cylinder. Fifth: To improve gas-engines of the type referred to in numerous other ways, "all as fully described"—in a lengthy specification and four sheets of detail drawings.

Incandescing Bodies for Incandescent Lighting.—Hirsch, E., of Berlin. No. 9864; May 10, 1905.

Mantles manufactured in accordance with this process may, it is said, be compressed or even flattened without injury. "If the original form is again carefully imparted to them with the fingers, and the coating of stiffening liquid is burnt off, the mantles are entirely uninjured." After being impregnated with the oxides of the rare earths, dried, and formed and hardened by high-pressure gas in the usual manner, the mantles are immersed in a 5 per cent. solution of zirconium nitrate, dried, and then immersed in the stiffening fluid and again dried.

Treating Certain Products of Ammoniacal Liquor obtained by Washing Illuminating and Heating Gases.—Radcliffe, J., of East Barnet. No. 10,075; May 13, 1905.

The ammoniacal liquor obtained by washing gases, the patentee remarks, usually contains compounds of cyanogen—particularly sulphocyanides; and after the distillation of the ammonia these compounds are found chiefly in the spent liquor, and also in the gases remaining after the absorption of the ammonia. "To dispose of the spent liquor in a satisfactory manner is a difficult problem, as the spent liquor is very harmful to vegetation, fisheries, and the like, and introduces difficulties in drainage and sewage treatment—particularly on account of its odour and alkalinity, and of the presence therein of sulphocyanides. The gases remaining after the absorption of the ammonia, which consist chiefly of sulphuretted hydrogen, also contain compounds of cyanogen and sulphur; and these gases are also difficult to dispose of satisfactorily."

The object of this invention is to "more efficiently recover the sulphocyanides, and to produce an effluent which is harmless, or nearly so." This is accomplished by means described, which "ensure that correct mixtures of the precipitating media are made and maintained continuously for weeks and months without skilled labour or excessive supervision; the materials used being those previously used for forming a precipitate of sulphocyanide of copper."

To the spent ammoniacal liquor as made, the patentee proposes to add continuously an acid—such as hydrochloric or sulphurous acid—for neutralizing the alkalinity of the liquor; and then copper sulphate or chloride, or other compound containing copper, either in the lower form of oxidation or in such a manner that the lower form of oxidation is produced.

The liquor is made to flow at a constant rate per unit of time, or at a rate corresponding with the amount of precipitating media employed, by passing it through a hole, preferably in a piece of agate or other unwearing material, at a constant pressure, which can be regulated by the use of a ball-valve tank constructed of suitable materials; the liquor being freed from lime or other suspended matter by any known methods. The rate of flow being fixed, an analysis for sulphocyanides is performed, from the result of which is calculated the amount of copper required, according to the law of equivalents. If the analysis be determined on the ammoniacal liquor before distillation, it is convenient to deduct about 10 per cent., or slightly more or less according to circumstances, as in some cases the sulphocyanide compounds are found in the gas remaining after the absorption of the ammonia. The copper, prepared in a solution of the required strength, is then delivered continuously in like manner through a similar hole of proportionate size. The addition of the acidifying material may be made either before or after that of the copper solution, or simultaneously with it, by similar means; or the continuous mixing may be effected by the use of three pumps worked from the same shaft—namely, one delivering the spent liquor, another the acid, and the third the copper solution. The spent liquor is preferably taken hot, as the precipitate will separate better in a hot fluid; and the precipitate is collected and removed from time to time by any known means—as, for instance, by pumping the sludge to a filter press, while the treated effluent passes through a filtering screen and flows away continuously. If containing free sulphurous acid, the effluent may be neutralized with an alkali.

The copper solution is conveniently made by the use of two or more tanks connected with a constant-level tank or tanks, and used from one, so as to give the opportunity of making up the solution in the other, without interfering with the continuity of the working.

The process can be adapted to deal with the gases remaining after the absorption of ammonia, by burning them (preferably) in a furnace assisted by a flame or fire, and passing the products of combustion into a scrubber provided with a water jet or jets, when the solution can be used for the purpose previously mentioned. If a flame or fire is employed, the resulting carbon dioxide will also assist in neutralizing the lime or other alkalies. If the spent liquor before treatment is sufficiently cool, it is passed down the scrubber and brought directly into contact with the gases which have been consumed. Any sulphur dioxide which escapes solution in the scrubber can be retained in a receptacle packed with limestone and provided with a water jet or jets. The sulphocyanide of copper can be treated with alkalies in order so as to decompose it into cuprous oxide and marketable compounds of cyanogen.

When the process is working by means of a precipitation made possible by the combustion of sulphuretted hydrogen obtained from the same source as spent liquor—that is to say, when sulphurous acid is produced from the saturator gases—it may be important to ensure that the smallest quantity necessary to make the reaction possible be used. To this end, a connection should be made from the main outlet from the saturator by means of (say) a 2-inch pipe and a valve fixed thereon, so that, after the gas is burned in the furnace and a resulting solution of sulphurous acid added to the spent liquor, a series of trials should be made of precipitations of copper sulphocyanide with varying amounts of sulphuretted hydrogen used (adjusted by means of the valve), so that a good precipitation is made with the smallest amount of sulphuretted hydrogen burned. A minimum of sulphites will then be found in the treated effluent, and when neutralization of the effluent after settling out copper sulphocyanide is resorted to, a minimum amount of lime will be required. A varying amount of sulphurous acid will be required according to the degree of alkalinity of the spent liquor.

If it be desired to recover nearly the whole (say, about 98 per cent.) of the sulphocyanides, it is, of course, necessary to ascertain by analysis the proportion existing in the spent liquor and add the equivalent of copper salt. In this case, small quantities of copper may be found in the treated effluent. This is recovered when lime or other alkali is added and the precipitate intercepted before it finally discharges, or it can be recovered by passing the treated effluent through a tank containing iron.

In some cases, when the dilution by sewage or water of the treated effluent happens to be large in extent, it will be found (the patentee remarks) that the precipitation of a proportion only—say, 75 per cent.—of sulphocyanides is sufficient. It is found that this precipitation is effective in carrying down tarry matter, which in some degree is responsible for the objectionable qualities of spent liquor—the offensive odour being also partly due to its presence. The presence of small quantities of sulphuretted hydrogen in the spent liquor is also partly responsible for its odour, and this is also partly removed by sulphurous acid, so that the treated effluent is comparatively inodorous.

The disappearance of objectionable qualities in effluent treated by the present process is said to be not due to large dilution with water, as the process can be worked with the addition of less than 10 per cent. of water.

If the spent liquor upon acidification with sulphurous acid throws down much precipitate, it will be advisable to settle this down alone. By this means the spent ammonia liquor can be purified; some deleterious compounds being modified or neutralized and others removed entirely from it, and the sulphocyanides recovered.

The gases remaining after the absorption of the ammonia are, it is claimed, also economically dealt with, and sulphocyanides recovered in a "continuous, simple, and efficient" manner. The efficiency of the process with regard to the effluent is said to be demonstrated by its effect upon the bacterial process for the treatment of sewage, which failed to work when untreated spent liquor was added to the sewage, but will be found to work effectively after the spent liquor has been treated by the process. When the same relative proportions of spent liquor and sewage have been present in each case, the addition of about 16 per cent. of this treated effluent stimulates bacterial growth so as to increase by about 50 per cent. the number of bacteria in a cubic centimetre of such sewage. It will also be found that fish which have been killed by water mixed with untreated spent liquor will live in the same relative proportions of water and effluent from which the sulphocyanides (and tarry matter) have been precipitated by copper salts according to this process.

Producing or Enriching Coal Gas.—Hooton, R., and Noble, J., of Ashton-under-Lyne. No. 10,733; May 23, 1905.

The inventors propose to produce or enrich illuminating gas by "materials now looked upon as waste"—viz., the husks or shells of cotton seed as obtained in the cleaning of cotton. Such husks or shells, in suitable quantities (according to the enrichment required or the amount of gas to be made), are introduced into an ordinary gas-making retort along with the ordinary coal, or along with any suitable form of low standard coal—such as coal slack or coal breeze.

Prior to use, the shell matter may be compressed in bulk by hydraulic pressure, with or without heat, and with an admixture of an adhesive substance, such as oil and resinous waste or seaweed, in order to cause it to lie in small compass and be readily introduced into the retort.

The proportions of the shell matter to the coal or coal slack may be as follows: Coal or coal slack, by bulk, 100 parts; shell matter, by bulk, 25 parts.

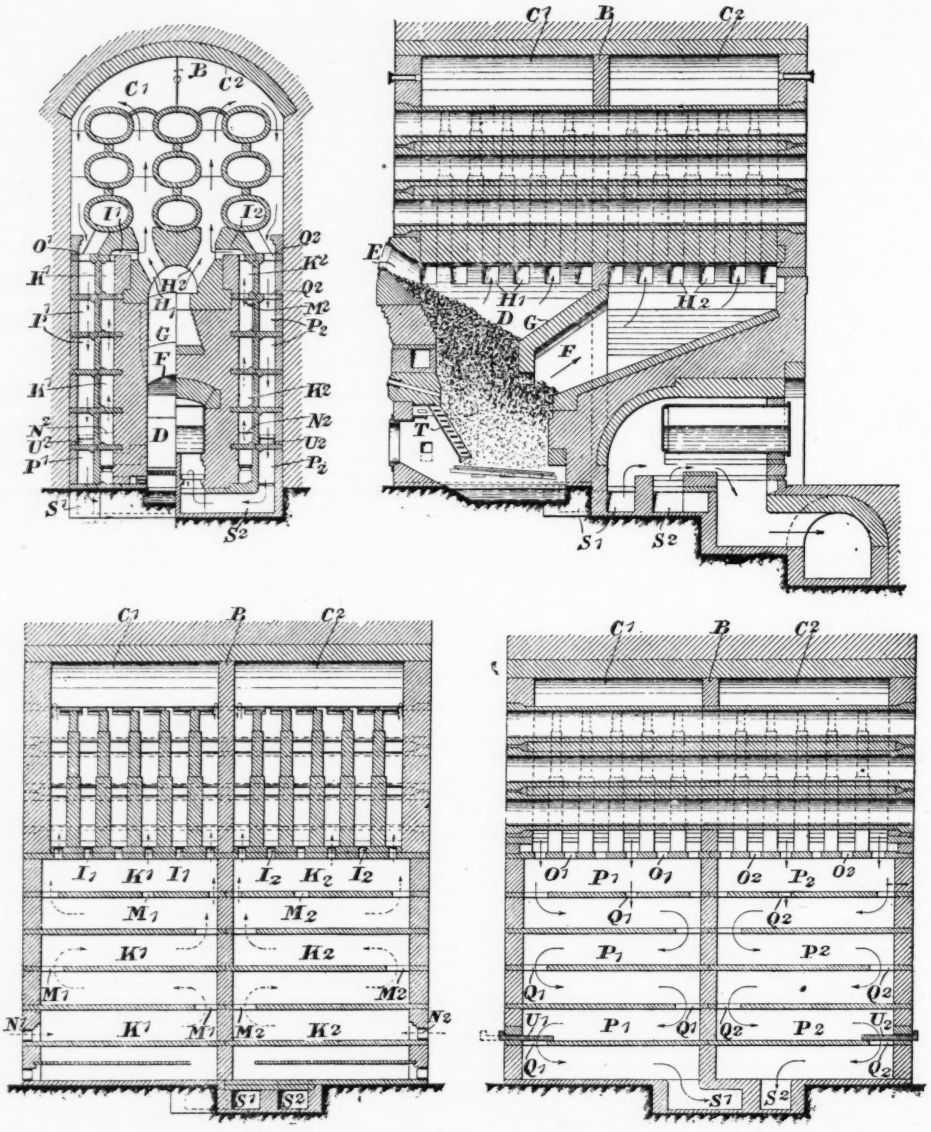
When used with ordinary coal, the shell matter is said "to enrich the gas and greatly increase its illuminating power, and when used with coal slack or breeze, it enables what has previously been treated as waste or unfit for illuminating gas producing purposes to be used in the production of a good quality of gas. In addition to being of value in the producing or enriching of gas, the shell matter, when carbonized, yields a good quantity of carbon and various useful bye-products."

Retort Settings and Regenerator Furnaces for Same.—Körting, E., of Berlin. No. 12,176; June 10, 1905.

This invention relates to "means for heating retorts of great length." Where the retorts to be heated exceed a length of about 3 metres, the patentee points out, "it has been found necessary to take some steps to insure the distribution of the heat, as otherwise the extremities of the retort lying more closely adjacent to, and remote from, the furnace or heat-generating chamber would be unequally heated. It has been sought to solve this difficulty by providing, in the generating chamber or the retort-chamber, partitions to separate and direct the heating gases, and also to use a plurality of generating chambers feeding the different compartments of the retort-chamber with combustible gases. The disadvantage has been that where separate heating chambers are provided, they must be separately charged and regulated, and where one is used, the partitions cannot be made to equally distribute the heat; and as a result, in either case, the retorts are unequally heated, thereby impairing the efficiency of the operation, adding to the cost, and depreciating the quality of the product."

The retort-bend (as shown) is divided transversely by a wall B, thus forming the retort-heating chamber into two compartments C_1 and C_2, both of which are supplied with combustible gases from the twin generator, which is provided with the stepped grate T and the charging door E. The generator is divided into two parts D and F, by a partition G, which projects downwardly from the floor of the retort-heating chamber. The lower edge of the partition occupies a position slightly lower than the normal level of the fuel in the generating chamber; the two compartments D and F being thus isolated except for the communication through the porous body of fuel in them.

The front generator compartment D communicates, by channels H_1, with the front retort compartment C_1, which channel serves for the passage from the compartment D to the compartment C_1 of the combustible gases generated from the fuel. As the gases pass through the channels H_1, they come into contact and are thoroughly mixed with



preheated air or other combustion supporting gases from the channels I_1. The air is warmed during its circuitous passage from the inlet N_1 through the channels K_1 and the openings M_1 connecting the channels. The incandescent gas mixture plays about the retorts in the compartment C_1, and having given up its heat to the retorts, passes out through the openings O_1 and through the circuitous channels P_1 and openings Q_1 to the smoke-flue S_1. It will be seen that the separate gases escaping serve to preheat the incoming air; the channels K_1 and P_1 lying alongside each other in the side walls of the structure.

The rear generator compartment F communicates with the compartment C_2 by channels H_2; and the combustible gases from the compartment F, passing through the channels H_2, are intermixed with incoming air through the channels I_2—the preheating of the air being effected by passing through the openings and channels K_2 and M_2, and serving to heat the portion of the retort lying in the rear chamber C_2, and the spent gases being carried off, through O_2, P_2, Q_2, and S_2, in the way described with relation to the gases generated in the forward generator compartment D.

It will thus be seen that the one twin generator serves to supply combustible gases to both the retort compartments C_1 and C_2; the gases generated in the compartment D going to the compartment C_1, and those generated in the compartment F going to the compartment C_2, whereby both extremities of the retorts lie in independent chambers and are yet heated by combustible gases generated from a single charge of fuel. This provides for the maintenance of approximately the same temperature throughout the retorts.

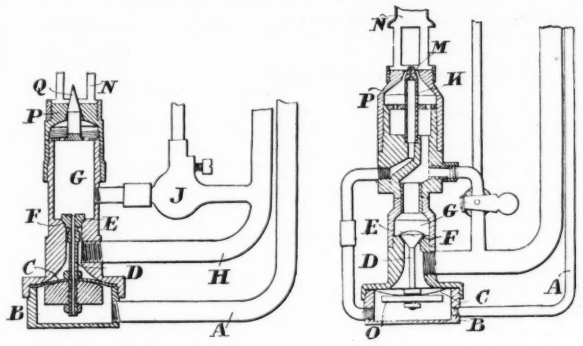
In order to even more efficiently govern the heating of the retorts and bring the regulation of the heat entirely within the control of the operator, dampers U_1 U_2 are provided in the outlet flues from both retort compartments at a point adjacent to the smoke discharges S_1 S_2. These dampers are independently adjustable, to shut off to a greater or less degree the escape of the spent gases from either retort compartment. Thus, while both dampers are left open, the combustible gases will pass in substantially equal quantities from the generating compartment D and F through the compartment C_1 and C_2, maintaining substantially the same temperature in each. If, however, the damper U_1 be closed in a greater or less degree, the effect will be to exert back-pressure through the channels K_1, damming the combustible gases in the compartment C_1, and prevent the entrance of more gas from the generating compartment D.

The result of this arrangement will be that the combustible gases will pass through the porous fuel in the generator chamber into the compartment F, and thence into the retort compartment C_2, heating the rear portion of the retorts to a higher temperature. If, on the other hand, the damper U_2 be closed and the damper U_1 be open, the effect will be reversed.

Automatic Gas-Lighting Apparatus.—Roessler, A. C., of Wandsworth, and the Air Light Company, Limited, of Victoria Street, S.W. No. 15,205; July 24, 1905.

This invention relates to the type of apparatus for automatically lighting a number of gas-jets in a district employing gas and air under pressure for lighting, in which the operation of the automatic lighting and extinguishing devices is effected by the turning on of pressure in the pipe which supplies air to the burner—the air pressure acting upon a diaphragm operatively connected to a valve which controls the gas supply.

The gas-lighting device consists of: (1) An air outlet from the diaphragm chamber as well as an air inlet whereby all the air passing to the burner flows through the diaphragm chamber; (2) a weight attached to the diaphragm for determining the pressure at which the gas-valve will be opened; (3) means for intimately mixing the gas and air, and for adjusting the quantity passing to the bunsen tube. A separate bye-pass for the main gas to the burner is provided for enabling the lamps to be worked on the ordinary low-pressure system.



According to the first form illustrated, the air-supply pipe A leads to a chamber or shell B, one side of which is closed by a flexible diaphragm C. From this chamber the air passes by a pipe which has its outlet at the burner mixing-tube, where the gas and air are mixed before passing to the bunsen tube. The flexible diaphragm is loaded and connected, by a rod D, to a poppet valve E, adapted to be held close by the weighted diaphragm against a conical seating F, formed in a chamber G, communicating with the gas-conduits H to the burner. A cock controlled bye-pass pipe J is arranged between the gas-pipe and the burner side of the poppet valve; the cock, when in its closed position, being arranged to let a small quantity of gas pass to a pilot flame, which is always maintained at the lamp. When the cock is opened, gas flows directly from the gas-supply pipe to the burner-tube without passing through the poppet valve. The introduction of the air and gas is effected in the form of uninterrupted concentric streams; the maintenance of this feature in combination with an automatic lighting and extinguishing devise of this type being, it is said, of considerable importance.

The gas and air may be arranged to mix before issuing to the burner-tube, or they may be led separately through nozzles which issue into the burner-tube. This latter method is illustrated in the second arrangement.

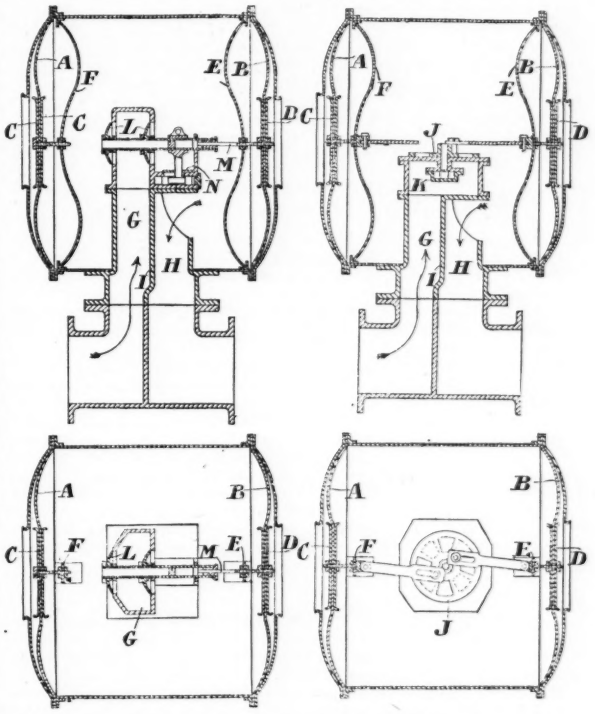
When the gas and air are allowed to mix before issuing to the burner-tube N, the rod D K, connecting the diaphragm to the gas-poppet valve, is made hollow, and the mixing-chamber G is arranged immediately over the poppet valve E. The outlet from the mixing-chamber is preferably made adjustable by means of a fixed central conical pin Q, carried by a perforated disc, which acts as a spreader, and passing through one end of an adjustable nipple P. In this way, by screwing the nipple over the conical pin, the annular opening for the gas and air is decreased and regulation of the heating or lighting is effected.

In the second form illustrated, the air is led from the diaphragm chamber by a pipe K, having a nozzle M, which issues at the bunsen tube N; while the gas is led in an interrupted annular stream outside the air-pipe K, and issues in an annular spray at the burner-tube. The size of the opening in the air-nozzle and the air pressure used in the circuit determine the weight O, which is put on the loaded diaphragm. The quantity of gas passing to the burner is regulated by adjusting the axial position of the gas-nipple P. The gas and air issue at a high velocity into the bunsen tube of the burner, and thus draw in additional air from the atmosphere, or from an additional supply conduit, after the manner of an injector, in cases where complete enclosure is desired. The operation of the above devices is as follows: The gas supply is turned on to the lamps; and then the air-supply device is started. In this way the pressure in the air-supply pipes A rises sufficiently to raise the weighted diaphragms C, and thus open the gas-valves E. Gas then flows to the burner in either of the ways described above, and is ignited at the burner-head by the pilot flame. The air pressure is maintained within the air-pipes because of the restricted area of the air-outlet nozzle; and thus the diaphragm is maintained in the raised position, and, consequently, the gas-poppet valve held open during the time the air pressure in the circuit is kept on.

Anti-Pulsators for Gas-Conduits.—Thorp, T., of Whitefield, near Manchester. No. 15,697; Aug. 1, 1905.

This invention of an anti-pulsator to be used for regulating the flow and pressure of gas in pipes, consists in extending and contracting the anti-pulsator chamber within certain limits without altering the valve openings, and thus render slow and gradual the opening or closing of the valve when the contraction or extension exceeds the defined limits. These anti-pulsators are more particularly intended for use with inferential rotary station meters, such as are described in patent No. 20,214 of 1901, placed in the pipe leading from the gas supply to the exhauster, in which the pulsations in the pipe injuriously affect the correct registration of the gas passing through the meters; but they may be applied for other purposes—as, for instance, the regulation of the flow and pressure in gas-pipes supplying gas-engines.

Anti-pulsators used with the inferential gas-meters, the patentee points out, require, on the one hand, to be very sensitive—that is to say, they must expand and contract with a very slight variation of pressure, in order to prevent pulsations in the gas-pipes which would prevent the correct registration of the volume passing through them by means of inferential meters or others affected by pulsations; but, on the other hand, the inlet valve of the anti-pulsator should not be closed or opened very quickly, as this again would produce pulsations preventing correct registration. To attain these objects, the valve is positively coupled to the diaphragms of the anti-pulsator, or one of them, by a connection which allows the free movement of the diaphragm or diaphragms within certain limits without moving the valve, but compels the valve to open and close when these limits are exceeded. Preferably springs of the kind described in patent No. 5791 of 1905 are used to pull the diaphragms inwards; the pull of the springs decreasing as the diaphragms move outwards, thereby compensating the increasing inward pressure of the diaphragms. A dashpot (the plunger of which is connected to the valve which renders the movement of the valve slow and gradual when the movement of the diaphragms exceeds the limits allowed by their connections to the valve) is employed so as to obtain a gradual opening and closing of the valve preventing pulsations.



Two forms of construction are shown. The anti-pulsator consists of a preferably cylindrical casing over the ends of which flexible diaphragms A and B are fixed by being clamped between the angle-iron rings of the casing. The covers are then bolted thereto. The diaphragms are stiffened in the centre by plates C and D, and connected by bolts to springs so arranged that they draw the diaphragms towards each other. Preferably flat spring blades bent into a corrugated curvature between the neutral curvature and that of maximum pressure (as described in patent No. 5791, of 1905) are employed, the pull of which on the diaphragm connected to it decreases as the diaphragm moves outwards, and thus counteracts the increase in the resistance of the diaphragm to its outward motion. To the bottom of the casing an inlet-pipe G and an outlet-pipe H are fixed. Preferably these two pipes are formed in a single casting divided by a partition plate I. To the underside of the pipes the connections to the gas-mains are fixed, which, in the arrangement shown, consist of a casting divided by a partition plate so as to form separate inlet and outlet branches—the gas entering the casing through the pipe and flowing out as indicated by the arrows. The top of the inlet-pipe is provided with a valve so connected to one or both of the diaphragms that they can move inwards and outwards within certain limits without moving the valve, and a dashpot is attached to the valve which retards its motion when these limits are exceeded.

In the first arrangement shown, the valve is a rotary slide valve J with ports; and the top of the inlet pipe G is enlarged into a chamber K, the top of which is formed with corresponding ports indicated in dotted lines. The bolts attaching the diaphragms A and B to the springs E and F are formed with slotted heads to which links are connected by pins. The other ends of the links are formed with elongated slots, into which pins fixed in the rotary slide valve J engage—the slots allowing the diaphragms to move inwards or outwards for a certain distance without moving the valve, which is fixed on the central spindle.

The valve is shown closed, into which position it will be brought by the outward movement of the diaphragms when the flow of gas through the outlet pipe is stopped. When the outflow is resumed, the pressure inside the casing will be reduced and the diaphragms will be moved

inwards by the springs, the other ends of the slots in the links encountering pins, and the valve is thus opened. To prevent the sudden opening of the valve to the full extent—which, by causing an excessive pulsation in the supply pipe, would interfere with the correct registration by a rotary gas-meter inserted into the supply pipe leading to the inlet—the movement of the valve is retarded by a dashpot of any suitable construction. That represented consists of a short cylinder in which two partitions are fixed extending to the central spindle, which is formed with two wings. As the valve and spindle are turned, the liquid in the dashpot has to pass from one side of the wings to the other, past the wings or through small perforations or grooves in them, and this retards the motion of the valve. By this arrangement the ordinary variations of the flow into or from the casing are compensated by the free expansion and contraction of its capacity by means of the diaphragms, and the valve comes only into action when the variations of flow or pressure become greater. It, however, then acts gradually; the dashpot preventing the sudden opening or closing of the valve, which, by suddenly stopping or starting the inlet current, would preveut the correct registration of the flow by means of a rotary or other meter affected by pulsations.

Preferably, the second arrangement of valve and dashpot is used. In this, the valve employed is a double-seated equilibrium valve L, the spindle of which is suitably guided and tubular. A piston formed on the bolt M, connecting the spring E to the diaphragm B, can slide inside the tubular valve spindle between stops fixed in the tube, so that the diaphragm can move in and out for the distance the piston can travel without coming against one of the stops, and only moves the valve when the movement of the diaphragm exceeds this distance. To prevent the sudden opening and closing of the valve, it is connected to a dashpot, which, in this instance, consists of a cylinder in which a piston fits, which is connected to the tubular valve spindle by an arm entering into the piston and clamped to the spindle. The oil filling the cylinder passes from one end to the other through a fine bore through the piston of a small groove or clearance on its underside. The slot in the upper side of the cylinder in which the arm moves is closed by a sliding cover N. The action of this arrangement is the same as that of the one already described.

APPLICATIONS FOR LETTERS PATENT.

12,098.—Gill, E., "Gas-lighting device." May 24.
12,210.—Potter, H. N., "Cleansing gases." May 25.
12,225.—Sodeau, W. H., and Brady and Martin, Ltd., "Apparatus for gas analysis." May 25.
12,270.—Mason's Gas Power Company, Ltd., and Bentley, G. H., "Suction gas-producers." May 26.
12,309.—Smith, G. B. & E. W., "Coin-freed meters." May 26.
12,352.—Scott-Snell, E., "Incandescent lighting." May 28.
12,432.—Roche, H. J. E. A., "Internal combustion engines." May 28.
12,451.—Wynn, J., "Combination gas cooking and heating stove." May 29.
12,465.—Hartenstein, H. L., "Manufacture of carbide." May 29.
12,467.—Wilkie, J. B., and Hutchins, T. W. S., "Producer gas-generators." May 29.
12,494.—Briggs, W. M., "Gas-regulator." May 29.
12,522.—Allen, T. G., "Acetylene-generator." May 29.
12,524.—Braunstein, J., "Self-lighting burners." May 29.
12,567.—Williamson, A. B. & T., "Gas-shade." May 30.
12,570.—Fielding, J., "Four-stroke cycle internal combustion engines." May 30.
12,595.—Sharp, A., "Multi-cylinder internal combustion engines." May 30.
12,623.—Deutsche Gasgluhlicht Akt.-Ges.(Auer-Ges.), "Incandescent gas-lamps." May 30.
12,624.—Deutsche Gasgluhlicht Akt.-Ges. (Auer-Ges.), "Inverted incandescent gas-burners." May 30.
12,644.—Wright, J. W. B., and Darwin, H., "Inverted burners for incandescent gas lighting." May 31.
12,650.—Beasley, F. G., "Gas-stream controller." May 31.
12,682.—Scott-Snell, C., "Incandescent lighting." May 31.
12,717.—Webb, J. E., "Gas-burners." May 31.
12,734.—Donkin, H. J., and Haigh, T. H., "Valves." May 31.
12,736.—Pass, A., "Gas and other turbines." June 1.
12,875.—Helps, G., "Burner nozzles and mantle supports." June 2.
12,923.—Egge, F., "Gas-burners." June 2.
12,924.—Ingram, H., "Open-air flare-flame gas-burners." June 2.
12,945.—Roessler, A. C., and the Air-Light Company, Ltd., "Compressing plant for gas." June 2.
12,952.—Bickerton, H. N., and the National Gas-Engine Company, "Valves for internal combustion engines." June 2.

Wolstanton Gas Bill.—At a meeting of Wolstanton gas consumers, which was held recently, to discuss the Bill now in Parliament, the following resolutions were passed almost unanimously: "(1) That in the opinion of this meeting of consumers of gas of the Wolstanton united district, convened by public notice, the installation of a gas-works by the United Urban District Council of Wolstanton is unnecessary, and will not be beneficial to the consumers of gas within the united urban district, who are now supplied in a satisfactory manner and at a reasonable charge by the Corporations of Burslem and Newcastle-under-Lyme. (2) That the proposed purchase of the Chesterton Gas-Works and site, and the erection of a new works on that site, is an unsatisfactory scheme, and against the interests of gas consumers of Wolstanton. (3) That the meeting fully approves of the action of the actual petitioners, and confirms the course taken by them, and resolves that the following gentlemen be authorized by the meeting to attend and give evidence on behalf of the consumers petitioning against the Bill: Messrs. Ball, Grocott, Leigh, Brooke, Bentley, Guildford, and Cooke."

LEGAL INTELLIGENCE.

Theft of Gas-Piping in Glasgow.

On Monday last week, a man named Ernest Moss was charged at the Central Police Court, Glasgow, with the theft of a quantity of lead gas-piping from the entrances to tenements of dwelling-houses in Bellfield and Mordaunt Streets, in the Bridgeton district. It was stated that complaints had been received at the Gas Office, from residents in Bridgeton, that their gas supplies had been cut off without notice. It was then found that long pieces of piping had been wrenched off and taken away. The same evening two policemen observed the accused with a bundle of gas-piping near a metal refiner's establishment, and when accosted he said he had got the piping from a man he did not know. He pleaded guilty, and received sentence of imprisonment for 30 days.

Interfering with a Meter Inspector.

An Oldham master plumber named Chadwick was last Wednesday summoned before the Magistrates by Mr. Arthur Andrew, the General Manager of the Gas and Water Department, for a breach of the Sale of Gas Act, 1859. Mr. Garside, the Deputy Town Clerk, explained that Chadwick was charged with having unlawfully refused to allow one of the Corporation inspectors to put water into his gas-meter. Inspector Robinson went to defendant's warehouse in Henshaw Street for this purpose. Defendant asked what authority he had; and the Inspector said that Mr. Andrew had sent him. Defendant replied that the meter was his property and on his premises, and that he would not allow the man to put water in it. When the report of the Inspector was presented to the Gas Committee, they decided that, though it was a trivial offence, they must take cognizance of it, to prevent like cases arising. They did not ask for a heavy penalty. Defendant said meters were frequently flooded by inspectors, which was unnecessary and against the consumer. A fine of 5s. and costs was imposed.

Award in the Geltsdale Arbitration.

In the "Journal" for the 13th of March last (p. 749), the proceedings were reported in an arbitration in which the Earl of Carlisle and the Corporation of that city were the chief parties. His Lordship claimed compensation in respect of damage to his Geltsdale property, in Cumberland, consequent upon the carrying out by the Corporation of their water scheme, and also for being deprived of the water contained in the watershed. The amount claimed was £33,559; being £10,671 for land and easements and compensation for injury done in the execution of the works, and £22,888 for water taken, which the claimant said he had power to sell. The Corporation offered £2400 in settlement of the full demand. The matter went to arbitration—Mr. Hesketh, of Penrith, acting for Lord Carlisle, and Mr. Fenwick, of Leeds, for the Corporation; while Mr. J. Farrer, of Oulton, was the Umpire. The proceedings extended over five days; and the Umpire has now made his award, which was submitted by the Town Clerk (Mr. A. H. Collingwood) at a special meeting of the Geltsdale Water Committee of the Corporation held last Wednesday. Lord Carlisle has been awarded £17,261 14s. 2d. as purchase-money for land and compensation for damage, and £1476 6s. 9d. as compensation for the purchase of easements; making together £18,738 os. 11d. The Corporation had been advised that Lord Carlisle had no power to sell the water; and as the amount awarded is largely in excess of the total claim under other heads, it is assumed that some portion is in respect of water. The Town Clerk therefore recommended that the question should be submitted for the opinion of Mr. Balfour Browne, K.C., and Mr. Ernest Page, who conducted the case for the Corporation, as to the desirability of requesting the Umpire to state his award in the form of a special case for the opinion of the High Court. It was resolved that the recommendation should be adopted.

An American Decision on Water-Rates.

Reasonable water-rates were the subject of a voluminous decision of the New Jersey Chancery Court a few months ago, says "Engineering Record." In its decision, the Court ruled that a municipality, independent of statute, have power and owe a duty to protect the inhabitants against extortion in the price charged for water supplied by a private company providing water for public and private consumption, and to compel them to furnish it at reasonable rates. It is a city's duty, however, to establish such rates as would enable the company to derive a fair income, based on the fair value of their commodity at the time it is being used by the public, taking into account the cost of maintenance or depreciation, current operating expenses, and the right of the public to have no more exacted than the service in itself is reasonably worth, including a fair income to the stockholders on their investment. At the close of the decision, the following remarks occur: "It is wellnigh impossible to embody in a decree the rules and regulations and standard charges for the supply of water to a town; and it is quite impossible to so arrange them as to make the charges uniform, and at the same time distribute them equally among the different private consumers. Much must necessarily be left to negotiations in particular cases. Some towns allow the amount of frontage of an establishment to affect the charge. Then there is the element of vacant lots. When a new street is opened and partly built upon, the cost of laying the mains is precisely the same as if it were immediately closely built up; and this cost, of course, enters into the cost of supplying the pioneer builders on the street. These and other matters must be taken into consideration and dealt with in a spirit of accommodation, and with a desire to treat all customers alike. The water company should at all times bear in mind that they are exercising a public franchise, which they are to use and not abuse; and the municipality must bear in mind that the stockholders of the water company are entitled to a fair income on their investment."

CORRESPONDENCE.

[We are not responsible for the opinions expressed by Correspondents.]

The Examinations in "Gas Manufacture."

SIR,—As you are aware, considerable dissatisfaction has been expressed by teachers of "Gas Manufacture" with the ordinary grade paper in "Gas Manufacture" set at the recent City and Guilds examination in this subject, owing to a number of questions being included in the ordinary grade which really belong to the honours grade syllabus.

The Association of Teachers in Technical Institutes have recently sent a memorial to the Examinations Board of the City and Guilds of London Institute, calling attention to the objections raised by teachers, and requesting the Board to reconsider the matter before the results are published.

JOHN WILSON, Hon. Secretary,
Association of Teachers in Technical Institutes.

Park Mansions, Battersea, June 9, 1906.

The Cheapest Gasholder.

SIR,—Mr. Cripps has either hurriedly scanned or deliberately misconstrued my communication to you on the above subject, or he would not have introduced and attributed to me the phrase "cost per ton," and built thereupon a letter full of inconsistencies and misstatements, and not void of personal slight. He attributes to me the antiquated notion "that the comparative cost of structures should be based solely on the weight of material employed." None but a demented person would, I should think, have propounded such a theory at the present day or at any period of time.

The point at issue, so far as I am concerned, is the relative merits of gasholder design, judged by the amount of material employed in their structure per unit of capacity per 1000 cubic feet, as distinct from their total cost, as the latter figure is influenced by so many extraneous causes over which the designer has no possible control.

I have made no mention of the expression "cost per ton" which Mr. Cripps attributes to me. The antiquarian ideas of which he speaks are apparently his own, as he instances the use at the present day of cast-iron columns 2 inches thick in gasholder framing, and purifier plates 1¼ inches thick; and upon these assumptions he propounds a theory to the effect that, if the correctness of the design of an engineering structure is to be based on the cost per ton of material employed, then the more extravagant the design may be in the use of material, the cheaper it will apparently be per ton of structure, and proceeds to discredit my reputation on his own hypothesis.

One will freely accept his finding as to extravagantly designed structures in the use of metal costing relatively less per ton. But such a suggestion originates with Mr. Cripps; and he is surely doing your readers scant credit for common sense in compiling such nonsense.

Further, I never suggested "that wages increased proportionately with the cost of material at different periods." My phrase was (after mentioning a possible increase of 50 per cent. in the cost of material) "that the rates of wages also increased during such periods"—thus specifically guarding against the interpretation which Mr. Cripps has deliberately put upon it. If, however, it were of any real value at the present moment, I could give some very striking instances which occurred as recently as during the last trade boom, when the cost per ton for finished steel structural work increased relatively with the cost of raw material—thus showing that labour, although I admit not having increased in the same ratio, was rated by contractors in the same ratio as the advance in the cost of materials for work which was openly competed for.

I note Mr. Cripps's correction as to my having missed the point of the discussion; but I demur to his finding, as I commenced my former letter by stating that the correspondence that has appeared was "interesting so far as it goes, but that an important factor had been left out of consideration."

I did not question the simple fact stated as to the cheapest gasholder. My intervention was merely to direct attention to the fact that a bare statement of the cost was of no practical importance or of any service to enable one to judge of the relative merits of the design; my wish being to broaden the issue and make it of some practical utility, as in the past we have had a great deal too much flinging gross costs at random, which do not in the slightest degree advance the practice or the science of gas engineering, as they give no regard to the all-important question of "the market cost of materials at the time of construction."

Surely Mr. Cripps does not himself affirm that the cost of raw material does not affect the cost of completed structures. Therefore to compare the one with the other constructed at different periods of time, the item of cost of raw material must be taken into account.

Will Mr. Cripps deny that the identical design put into execution at different periods of time may range in cost as much as 50 to 60 per cent.? How can cost alone, therefore, be any guide to correctness of design—the point I raised in my former letter?

I have never taken exception to the capacity standard in dealing with gasholder costs. On the other hand, I have advocated such simple unit-basis so that like may be compared with like on a known and accepted footing—such as cubic foot of structure for ordinary building work, and weight of metal employed per unit of area covered in the case of roofs. But what I do object to is trying to make comparisons on the mere basis of cost. I, therefore, most strongly object to Mr. Cripps putting into my mouth the expression "cost per ton of material used"—a basis which I have persistently refused to accept as a guide in comparing the costs of structures. My original letter is based on the very fact that the cost of materials varies so much over different periods of time that the same article or structure can vary in cost 50 per cent., although constructed from the identical design; and therefore quantity of material used is a safer guide as to the efficiency of design.

Again I must take very serious exception to Mr. Cripps imputing to me a desire to discredit good designing and to encourage a mere spendthrift of materials. My whole pleading is for good designing, and to point a way of determining this by comparing the amount of metal which different designers employ to accomplish the same purpose, and to discredit the present practice of adjudging design by mere cost of erections, irrespective of locality and so many other factors over which the designer has no possible control.

The very object of the compilation of the table referred to in my former letter, and published in the "JOURNAL" for July 14, 1903, was to point out the great extravagance of some engineers in the use of material in structures of similar sizes serving identical purposes. To make my expression clear, I will quote from a portion of it—

> From a perusal of this table, it is remarkable to see the enormous difference there is between the weight of guide-framing of gasholders approximating the same sizes. As many of the gasholders of the light weight so far as their guide-framing is concerned, have been in existence for many years, and have stood the test of time, it is quite evident that others have been constructed with a margin of safety altogether beyond what is necessary for such structures.

The heading of the table also refers to a statement showing the weight of material employed per 1000 cubic feet of working capacity of modern gasholders by various designers. The very first column (after the date) brings out in somewhat startling sequence the fact that while one engineer employed as little as 264 lbs. of material for a 6½-million holder, another used as much as 483 lbs. for a 5½-million holder of nearly the same diameter, but with the same number of standards—137 ft. 8 in. high as compared with the former 143 ft. 6 in. high. The employment of 445 tons more material to guide a gasholder of somewhat lesser capacity clearly showed a wastage of material amounting to nearly 60 per cent., and conclusively proved bad designing.

Mr. Cripps himself, in his list of eight chief factors which influence the comparative cost of gasholders, gives the strongest proof possible that mere cost is no safe criterion as to good design. Five out of the eight headings are matters over which the designer has no possible control—viz., "Cost of raw materials and labour," "Carriage from contractors' works to site, &c.," "Special difficulties or facilities due to nature of site, &c.," "State of trade, &c.," "Rings and trade combinations, &c."—all of which influence considerably the mere question of cost.

These influences are common to all engineering structures. If, therefore, we are to effectively compare the relative merits of the design of anything, disturbing influences such as are mentioned, and which are peculiar to locality and not to design, must be eliminated. What objection can there be, therefore, to judge the design on the basis of quantity of material employed (not cost per ton), always provided that a practical engineer has been engaged in designing a structure that requires but average skill in its execution, and has due regard to longevity and the proper employment of material nearest to hand.

As a commercial engineer, and one who is called upon to not only spend money on designs but also to earn money for their execution and upkeep, I still maintain that the quantity of materials employed to accomplish a given purpose is not the only one, but certainly the principal, factor in determining the cost of any work, and consequently the correctness of an engineer's design.

Mr. Cripps has, by some extraordinary freak, riveted in his brain the expression "cost per ton of metal," which he repeats with variations at least five times and attributes the expression to myself.

I have already disclaimed using such an expression in the manner alleged, and seeing that Mr. Cripps has attributed to me in the present discussion a principle which seriously affects my professional reputation and has built thereupon a fantasy of misstatements and imputations which are calculated to seriously injure me professionally, I must ask him to issue a full apology and a complete withdrawal of the inferences and statements that he has attributed to me, as such criticisms emanating from such a source are of serious consequence to a professional man, and such as I cannot allow to pass unchallenged.

W. R. HERRING.

Edinburgh, June 8, 1906.

Workmen's Compensation Bill.

SIR,—In your issue of the 5th inst., you make some remarks on a letter of mine which appeared in "The Times" a short time since, and for which you were good enough to find a place in the "JOURNAL."

Referring to my suggestion that the reducing of the period to elapse from the date of the occurrence of an accident before compensation is paid—to three days instead of seven days, as proposed by the Government—might be conducive to a mild form of malingering, you say "but, with all respect for Mr. Thomas, the possibility or even the certainty of such a result does not appear to be sufficient ground for withholding from the workmen the compensation which may become their due."

You overlook the fact that I heartily approved of a suggestion that was made in Committee, that in cases of serious accidents, or of accidents necessitating an absence of over one month, compensation should commence from the dates of their occurrence. This proves that I have no desire to withhold from men compensation which may become their due, but merely to afford some protection to employers.

That the possibility of malingering is no idle supposition on my part is shown by statements made at meetings of two Friendly Societies, held yesterday, and reported in this morning's Sheffield papers. Mr. Blossom (of Sheffield), speaking at the Forty-ninth General Conference of the Grand United Order of Oddfellows, at Oldham, said: "The sickness experience of the Order, like that of other Friendly Societies had been excessive; and in this accidents counted for a great deal. Since the passing of the Workmen's Compensation Act, accident claims had enormously increased. In some cases he knew they had doubled, as in one great Society of his own city."

The Grand Master of the Order of Druids, speaking at Rotherham,

and referring to a resolution which came before the National Friendly Societies' Conference—viz., "That the Friendly Societies connected with the Conference should take early steps for representatives of each Registered Friendly Society to consult together with a view to coming to an arrangement with regard to paying full sick benefit to members of Friendly Societies who are also receiving compensation under the Workmen's Compensation Act"—said "he was of opinion that since the Workmen's Compensation Act came into force, Friendly Societies had experienced a heavier sick rate, and it was said it had brought among them more malingerers. That might be true or otherwise, but of one thing he was satisfied—that it had caused a certain class of members to declare on the funds who probably would not have done so had it not been for the benefits they received under the Act."

Sheffield, June 7, 1906. HANBURY THOMAS.

The Irish Association and the Gas Institution Meeting.

SIR,—As President of the Irish Association of Gas Managers, would you allow me, through your columns, to intimate to any members thereof coming to London to attend the meeting of the Institution of Gas Engineers this month, that I shall be pleased to place a room at my offices at their disposition for attending to their correspondence, meeting friends, making appointments, &c. My offices are within five minutes' walk of the meeting hall.

5, *Westminster Chambers, S.W., June 9, 1906.* R. B. ANDERSON.

The Laindon Gas Company's Share Issue.—A well-known North of England gas engineer writes, under date of the 6th inst.: "Anent your remarks on the Laindon and District Gaslight, Coke, and Water Company, my wife and I have had no less than nine copies of the prospectus of this Company—needless to say, without effect."

The American Municipal Trading Inquiry.

The Commissioners of the National Civic Federation of the United States, who, as has been already stated in the "JOURNAL," are on a visit to this country for the purpose of inquiring into the methods and results of private and municipal enterprise here, have lately been to Glasgow and Newcastle-on-Tyne. In both places they were most hospitably received; and much praise was bestowed by them upon what they saw. Several days were spent in Glasgow, looking over the electricity works, the tramway service, the gas-works at Provan and Tradeston, and the sewage disposal works; and in replying to a toast at a luncheon, Mr. M. E. Ingalls, one of the delegates, said that what they saw in Glasgow was what was wanted in the States. They needed a higher sense of public devotion in city government; and in no place could they get better inspiration than in the city of Glasgow. At Newcastle, the Commissioners spent a day as the guests of the Newcastle and Gateshead Gas Company; the morning being occupied by a careful inspection of the gas-works at Elswick. Subsequently, the visitors were taken for a short steam up the Tyne on one of the Tyne Improvement Commission's steam yachts, in the saloon of which luncheon was served. Among those present were Sir W. H. Stephenson, the Chairman of the Gas Company and of the Tyne Improvement Commission, and a number of the officials. On leaving the vessel, the guests gave hearty cheers for their hosts of the day.

Nottingham Public Lighting.—During the past winter, the Nottingham Lighting Committee have continued to extend the incandescent system, and have replaced the ordinary burners with incandescent lamps throughout the city; the total number of incandescent lights now being 4365 on 4373 lamps—leaving 13 lamps only to be converted. The result is, the Committee report, very satisfactory, as the lighting of the streets is much more efficient; and the cost for gas supply is considerably less.

Charge for Electricity at Lynton.—The Lynton Urban Council have decided, after considerable discussion, not to accept the offer of the local Electric Light Company to light the streets at 55s. per 32-candle power lamp per annum for seven years, but have determined to renew the undertaking at 50s. per lamp. One member complained that even the latter figure was very excessive, and laid stress on the fact that, but for the sanction of the Council, the Company would have to "shut up shop." He mentioned that a civil engineer in the district was contemplating forming a Gas Company at Lynton and Lynmouth, and was making inquiries from various landowners with a view to finding a suitable spot for works. The Chairman remarked that all electric light companies would have to come down in their charges.

A Gas Company's Objection to Subsidize Electricity.—The progress of the Farnworth Urban District Council's electricity undertaking is said to have "exceeded the anticipations of the most sanguine." Since the start in 1901, there has been a loss of £886; so that presumably an even greater deficiency was expected as the result of the Council embarking on this branch of trading. The Gas Company, at least, see no cause for rejoicing in this mild achievement, inasmuch as the loss on the electricity undertaking means an addition to their rates, without them deriving any corresponding benefit. At a recent Local Government Board inquiry, at which more money was asked for by the Council, Mr. Holden, on behalf of the Gas Company, contended that the amount spent on street lighting was high when compared with the cost of gas; and he also argued that the increase of the rates from 2s. 11d. in the pound in 1900 to 4s. in 1905 was largely attributable to the inconsiderate action of the Council in relation to electricity and tramways. He asked the Inspector to consider whether, in granting the additional borrowing powers sought for, the Board would be doing what was beneficial to the ratepayers generally, or only increasing a trading loss. The Clerk replied that the loss on the undertaking represented a rate of less than ½d. in the pound, and the addition to the Gas Company's rates only amounted to something over £5 a year.

MISCELLANEOUS NEWS.

MR. JOHN CARTER AND THE LINCOLN GAS-WORKS.

A Quarter-of-a-Century's Connection.

In celebration of his twenty-five years' connection with the Lincoln Gas-Works, Mr. John Carter, the Manager, on Wednesday entertained at tea the Mayor and members of the Corporation, the staff, and the workmen—the company numbering 116—in the large dining-hall of the Black Goats Hotel. Mr. Carter presided; and the vice-chair was occupied by Mr. W. H. Mainwaring, the Assistant-Manager. All the workmen, both day and night hands, were present.

After the loyal toasts had been honoured, the Mayor proposed the health of Mr. Carter. He said they were met to render honour where honour was due. They had many officials of the Corporation, some who had been with them a long time; but he was quite sure that it was no reflection upon any of them to say that there was not a man connected with the permanent work of the Corporation who was more universally respected in the City of Lincoln than Mr. Carter. (Loud applause.) Were he Mr. Carter, he should appreciate very keenly that burst of applause, because the bulk of them round the tables were practically in the position of being Mr. Carter's employees, and he (the Mayor) could conceive of no more satisfactory reward for any man than that, after having lived for 25 years with his employees, he should be greeted with such enthusiasm. It showed that Mr. Carter had solved one of the problems of modern life, in the establishment of harmonious relations between employers and employed. He expressed the hope that Mr. Carter might have health to serve them so faithfully for many years yet to come. Alderman Wallis (the Chairman of the Gas Committee) added a few words; remarking that Mr. Carter had the confidence of the Corporation, the Gas Committee, and the employees, and rightly so, because he had the welfare of the men at heart. It had been one of the greatest pleasures of his (the speaker's) life to be connected during the last seven years with the Gas Committee and the gas workers, and especially with his friend Mr. Carter. Alderman Wallis then went on to speak of the improved condition of the works and the workers, and said that, having paid for all extensions and improvements out of revenue, the Lincoln Corporation Gas-Works perhaps stood alone among the gas undertakings of the kingdom. Mr. John Burton, a retired gas worker, voiced the feelings of the men when he said that whenever the men had to approach Mr. Carter, they were always sure of a fair hearing.

The toast was received most enthusiastically, with musical honours, followed by three cheers for Mr. Carter, and three more for Mrs. Carter.

In responding, Mr. Carter said he was proud to see such a gathering as the one before him, which, with the exception of the oldest servant, whose health would not permit him to attend, he believed, included every employee in the Gas Department. Referring to the object of the function, he said he completed his 25 years' service in February, but postponed the celebration until June, in order that all might be present, which would not have been possible in the winter months. He said he was extremely obliged to the Mayor, to Alderman Wallis, and to Mr. Burton, for their remarks. He could honestly declare that in no other town in the kingdom had the same cordial relations obtained as existed in Lincoln between the gas employees and himself. That this feeling had not arisen from any laxity was proved by the working results, which were due to the hearty co-operation of Mr. Mainwaring and every member of the staff, and to every single one of the workmen. Mr. Carter then traced the history of the gas-works from their purchase by the Corporation on June 30, 1885, and said they were that evening practically celebrating the majority of the Corporation as gas owners as well as his 25 years' connection with the works. When the Corporation took over the undertaking in 1885, the annual output of gas was 162 million cubic feet; last year they produced 355 millions. In other words, the works as they at present existed were equal to two works of the size and capacity of those purchased by the Corporation. In 1885, there were 5700 consumers, now there were 10,300; and the length of mains had increased from 36 to 56 miles. This had been done without increasing the indebtedness of the city, but all had been paid for out of revenue. Further, the price of gas in 1885 was 2s. 8d. per 1000 cubic feet, and the meter-rents were 1s. per quarter. If these charges were in existence now, the amount collected for last year would have been £11,200 more than it actually was. Meter-rents had been abolished, and the price of gas reduced to 2s. 1d. per 1000 cubic feet. The concessions made were equivalent to a gift of £11,200 to the consumers. These were results which every one of them—every workman, every foreman, and the members of the Committee and Corporation—might well regard with the highest satisfaction, and which the citizens ought to, and he believed did, regard with due appreciation and gratitude. When the Corporation acquired the works, the men had to do seven days' hard stoking for 32s. per week, had nothing extra for Sunday work, and no two rounds were missed. Now, when in the winter seven days' work was necessary, they received 41s. 3d. per week. The men who were working at the retorts had not to expose themselves as formerly in all kinds of weather. The ownership of the Corporation had resulted in immediate and very great advantage to everybody. In addition to concessions to the consumers, £20,000 had been voted in relief of the rates, and they had a little nest-egg in the shape of a reserve fund of £14,000. In conclusion, he hoped these existing very pleasant and cordial relations would continue, at any rate as long as he occupied the position he did at the present time; and when the day came when his successor would follow him, he trusted he would have the pleasure and satisfaction of receiving as loyal and capable service from all as it had been his delight and pleasure to receive for so long.

The other toast was "The Mayor and Corporation," which was acknowledged by the Deputy-Mayor (Mr. C. W. Pennell), who paid his tribute of admiration to Mr. Carter.

GAS MATTERS AT NOTTINGHAM.

Sir George Livesey's Report to the Gas Committee.

May 16, 1906.

In accordance with your request that I should investigate and report upon the causes of the dissatisfaction with the supply of gas, I visited Nottingham, and inspected the three gas-works in company with Mr. Brown. I also had interviews with the Chairman of the Committee and with the Town Clerk.

I have obtained a large amount of information of all kinds bearing on the subject—mainly from Mr. Brown, who has most frankly given me all the assistance in his power.

The subject is a most difficult one, and has given me much anxious thought; but I think I can give the assurance that the causes of the trouble are all being dealt with, and that I may venture on the prophecy that the time is not far distant when the supply of gas in Nottingham will be as satisfactory as it is in the great neighbouring towns, though I cannot say that it is likely to be as cheap as in Sheffield. But that town stands quite by itself in that matter.

Reduction of Illuminating Power.—The unsatisfactory position that was so acute last autumn is due to the combination of a number of causes, and not to any one in particular. For instance, the reduction of two or more candles of nominal illuminating power has not in any one of the numerous cases where corporations and companies throughout the country have made such reductions caused the slightest inconvenience or loss of any kind to the consumers; and it is certainly not the cause of the difficulty at Nottingham—the experience of the last few years being quite conclusive on that point. But when such reductions are made, it is imperatively necessary to supply and fix free to the consumers—in substitution for their existing flat-flame burners—new flat-flame burners that will develop the greatest amount of light that can be obtained from the reduced quality of gas. Where this is done, the usual result is that the consumer actually gets a better light than before, because in all probability the burners he was using were not the best. Certainly in the case of the gas companies with which I am connected, the reduction of illuminating power, accompanied with the change of burner, has increased the light obtained by the consumers and has rather reduced than increased the quantity of gas used.

Standard Testing Burner.—The reason is that for all burners, other than incandescent, the light given depends upon burning the gas at the proper pressure, and with the right proportion of air. The standard argand test-burner recently invented by Mr. Carpenter, and adopted by the London Gas Referees for testing London gas, and also adopted in the new model clause to be inserted in all Gas Acts, has as its valuable peculiarity the means of regulating the supply of air, which should vary according to the quality of the gas if the proper lighting effect is to be obtained. A rich gas requires more air than a poor gas; and by means of a very simple and easy method of regulating the air supply, this burner is suitable for testing gas of all qualities.

Flat-Flame Burners and Air Supply.—With flat-flame burners, however, it is not possible to regulate the supply of air; but if the lighting power of the gas is not to be greatly reduced, or smoking is to be prevented, some means of proportioning the gas and air must be found. The object is attained by varying the size of the holes or of the slit in the burner. Small holes or a narrow slit cause the gas to issue in a thin stream, which has the same effect as increasing the quantity of air, and is necessary when rich gas is supplied. With a low-quality gas, larger holes or a wider slit is necessary—producing a thicker flame, and consequently less air in proportion. There is the same amount of air in both cases; but it is in contact with a greater or less quantity of gas. To be right, therefore, it is necessary to have a different flat-flame burner for every difference in the quality of the gas of (say) two candles. And this is the reason why, on reducing the quality, the burners should be changed. This, I am informed, has now been done. But I do not understand that it was done or offered to the consumers when the quality of the gas was reduced; and if not, it is probable that some of the complaints have been due to this cause.

Unsuitable Burners.—At one time, many burners adapted for the rich cannel gas of Scotland were used in England, with the result that consumers often did not get one-third of the light obtainable from the gas; and even with rather better burners, the average light was not much over half.

Nottingham Burners.—Nottingham consumers appear to have been particularly unfortunate in their burners; for in Mr. Brown's report of Sept. 28, 1904, there is the statement that only one burner that he tested gave as much as two-thirds of the light obtainable, and with that exception he says "we did not find one burner which would give half the available illuminating power contained in the gas."

Bad Burners One Cause of Complaint.—No wonder, therefore, with such burners in general use, that the reduction of illuminating power caused complaints. The burners in use, or many of them, were adapted for a very rich gas—probably for 20-candle gas or more; and to supply them with 14 would result in a very feeble light, whereas with proper 14-candle burners consumers would in all probability get more light than before.

General Want of Knowledge on the Subject.—Consumers generally know nothing about burners, or the proper method of using gas, and the ordinary plumber or gas-fitter gives them very little help. His business is simply mechanical; and it has not been the rule to require him to have scientific knowledge. I am not blaming him; for even gas companies have found it necessary lately to give special instruction to inspectors and others who come into contact with the consumers on these matters. From my conversations with Mr. Brown, and from his statements and reports, I am sure he is alive to these points; but the difficulty is in imparting his knowledge to the consumers. On this point, I would say that, although I do not advise that the gas authorities should do gas-fitting (which the ordinary tradesman can do as well), I do advise that the gas manufacturers should do for their consumers many little things—such as the supply and fitting of burners, the maintenance of incandescent mantles, &c.—which gas-fitters cannot do satisfactorily. I have dealt at this great length with the question of flat-flame burners for two reasons. First, its great importance; secondly, the general want of knowledge on the part of the consumers; thirdly, because we are such a conservative race and so slow to appreciate anything new.

Incandescent Burners.—In Germany, which is commonly supposed to be conservative, the incandescent mantle has been so greatly appreciated that it has practically displaced the old-fashioned burners; and, if we were wise, we should do the same. I fear, however, it will be a long time before the last flat-flame burner is consigned to a museum. Therefore consumers who continue to use them must be instructed and helped. Let them apply for help to the gas authorities.

Gas Makers should Introduce the Mantle.—But the efforts of gas manufacturers should be persistently directed to the introduction of the incandescent mantle burner, as by far the best of all lighting agents, and the cheapest. And here I feel it necessary to say that this work cannot be done as it should be by the ordinary gas-fitters or plumbers. The consumers should be taught how to do it for themselves. It is a very simple matter, the fitting of mantles; and many consumers of all classes do it themselves, having been instructed by the officials of the gas undertaking. Gas companies now very often undertake to supply and fix the burners, and to maintain the mantles at fixed charges—practically at cost price; and this is certainly the best way of doing this necessary work and of teaching the consumers to do it themselves. When the latter attend to their own mantles, care in their use as well as economy result.

Pressure of Gas.—Another cause of dissatisfaction is the very important subject of the pressure at which gas is supplied. This is measured in tenths of an inch—that is, a pressure of gas that will support a column of water one inch in height is said to be 10-10ths; 1½ inches, 15-10ths; and so on. A very large proportion of complaints is due to deficiencies and variations of pressure. Parliament fixes a minimum of 8-10ths in the mains; but with the introduction of gas-cooking stoves and incandescent mantles, nothing less than 15-10ths is sufficient; and to be safe, 20-10ths, or 2 inches, is now considered advisable as a minimum, with (say) 40-10ths as a maximum, for it is impossible to give an exact uniform pressure at all times and in all parts of the district. For instance, the pressure varies with the level and with the draught on the main. A gas-main in which the pressure is 10-10ths at the bottom of a hill, will 100 feet higher give 20-10ths if there is no draught upon it.

Excessive Variations in Nottingham.—Nottingham is a hilly place. I learn from Mr. Brown that the levels for the city on the Ordnance map range from 63 to 425 feet above Ordnance Datum. Where such variations exist, it is necessary to divide the gas supply into districts in order to send out the gas from the works at varying pressures. In Nottingham, however, all the mains were connected together in the district; consequently, the pressure was entirely uncontrolled. The high parts had a high pressure always, and a very excessive pressure at times—rising sometimes to 75 or 80 10ths. The low places had a generally low pressure, and to give them sufficient gas, extra pressure had to be put on at the works, with the result that the high places got much more than they wanted. It has been a very difficult work; but Mr. Brown tells me he has now succeeded in dividing the city into pressure districts, and I saw a very complete and effective arrangement of governors and valves at Basford for regulating the pressure and distributing the gas to the various levels of the city.

Results of Division.—This, however, has had two results. The pressure in the high ground has been reduced; and this has caused inconvenience to those consumers whose fittings were too small or defective. A house (say) is fitted with gas for ten lights, and pipes suitable for that number are provided. Gradually the lights are increased—doubled or more; but no alteration is made in the pipes. Again, the pipe leading from the meter is often absurdly small, I have known—in fact, it has commonly happened—an inch pipe up to the meter put in by the gas company, and the pipe put in by a local fitter leading from the meter, of only one-quarter the size or capacity—viz., a half-inch pipe. He has done this without thinking, and so long as the pressure is excessive, sufficient gas may be obtained through the small pipe; but directly the pressure is reduced to a proper amount, the consumer complains that his supply is deficient and blames the gas officials.

Reduction of Pressure Causes Complaints.—A very large proportion of complaints is due to defective fittings; and the best remedy is to apply to the gas officials for advice. I may add that excessive pressures are disadvantageous to the consumers because they waste gas. Whenever new mains are laid in a district to increase the pressure where it has been deficient, a greater consumption takes place, and those customers whose fittings are large, and who previously had enough gas, and even others who had not enough, are apt to complain of increased accounts—the result of an increase of pressure. I have no doubt a considerable number of your complaints have been due to the alterations that have been rightly made for the purpose of getting as far as possible a sufficient uniform pressure throughout the city, especially in parts where pressures were excessive, and the fittings of consumers faulty.

Defective Fittings.—Another great cause of complaints allied to the above is defective fittings. Not only are they often too small, but they are badly laid. The pipes in a house—in fact, gas-pipes everywhere—must be laid with a distinct fall, to drain off the water that condenses out of the gas. The service-pipes from the main to the meter must fall towards the main; otherwise water will sometimes collect and cause an obstruction, resulting in an unpleasant oscillation or jumping of the lights, and ultimately, unless removed, putting them out. This, however, seldom happens in the service-pipes, which are, I may say, always laid by the gas workmen with a fall towards the main, but sometimes afterwards disturbed by sewer work, &c. With the internal fittings, however, this defect is unfortunately rather common. If in any part of the piping there is a hollow space, or no regular fall back towards the meter, water will collect when wet meters are used. Evaporation always takes place from the water in the meter, it condenses in the pipes, and, where they are properly laid, flows back to the meter. But where they are faulty, the water collects and has to be removed from time to time, unless the pipes are put right. This can in many cases be done easily, but not always; and, in a small proportion, the best way out of the difficulty is to fix a dry meter.

Wet and Dry Meters.—I am, and always have been, an advocate of wet meters, because they are just measures. They may stop registering; but they do not register incorrectly beyond the narrow margin allowed

by law, either for or against the consumer. On the other hand, they cause the above-mentioned trouble where the fittings are faulty, and, if fitted in places exposed to cold, are apt to freeze in severe weather. They also need periodical attention for "watering," as it is called; for if the water is allowed to get too low, a valve closes, and the lights will go out. The tendency always is for the water to evaporate and never to increase. Dry meters, on the other hand, are free from all these troubles or inconveniencies; but they are apt to register incorrectly after a time—sometimes in favour and sometimes against the consumers. For many years after their introduction, sixty or more years ago, they were so unreliable that many gas companies and corporations, after a fair trial, gave them up entirely. The South Metropolitan was one of those Companies. My father was then Manager; and in my early days many hundreds of dry meters that had been in use, in many cases only a short time, were tested and found so incorrect and unreliable that the Company got rid of every dry meter and used wet meters exclusively.

Why Dry Meters have in some cases Displaced Wets.—But circumstances have been too strong for us, and dry meters, having been greatly improved and made dependable, though not even now so reliable as wet meters, have been introduced. We have sacrificed none of our wet meters that were not worn out; but the new ones purchased are mostly drys. To keep them right, it is necessary to have them tested periodically, which is not the case with wets; and with this care we find them satisfactory. Moreover, the slot meters are all dry; they being more convenient for that purpose, while wets would entail much trouble and expense for watering. The repair and maintenance of dry meters is more costly than it is with met meters.

Wet Meters and Fittings Badly Laid.—I think this puts the case fairly. My reason for dealing with it is the fact that many complaints are due to defective fittings in conjunction with wet meters. I asked Mr. Brown for a sample of the complaints; and he sent me some 380 letters and post-cards. He said: "The worst period was from Nov. 12 to 30, 1905; and I have therefore taken the whole of the complaints received during that period, and have posted them to you this evening." These, of course, are the written complaints only. I have read them all, and find them quite of the usual character, and am glad to say that all were courteously expressed, and I could not find an angry word. There are two or three which said they had complained before, and unless the defect was remedied they would have to give up gas; while one, apparently poor but honest, consumer writes that "the gas-meter is burning without money."

Complaints due to Water in Fittings.—Mr. Brown has two special "Complaints Inspectors," whose duty is to investigate a number of complaints each day. Three files of letters and post-cards have been sent me. The largest, with some 170 out of the 380 complaints, have the cause of the complaint written in red ink by the Inspectors; and of these about one-third, or 55 out of the 170, were due to "water in fittings." This is a very large proportion; and if it is any indication of the proportion generally, it reveals a very serious condition of many internal fittings, which, in the interest both of the Gas Department and of the consumers, must be remedied for the present and prevented for future consumers.

The Remedy.—The remedy is two-fold. Where the fittings can be put right, it should be done; and where this is impracticable, a dry meter should be provided. Then, instead of a periodical renewal of these complaints, they will cease, to the general advantage and comfort. These defective fittings are an indication of incompetence or want of care on the part of the gas-fitters, or plumbers as they are sometimes called. I am not going to recommend that the Gas Department should undertake the work of internal fittings, though I think they should exercise some supervision and take some steps to ensure the competence of the local gas-fitters. Some years ago—and I believe it is still the practice—the Gas Department of Manchester had a number of authorized gas-fitters. I do not know the exact conditions; but shortly it comes to this. Any respectable gas-fitter who is found to be competent may become an authorized fitter and advertise himself as such. If he should prove himself incompetent, or do his work carelessly, the authorization must be withdrawn. Lists of authorized fitters should be readily accessible to consumers in the various districts, who will then know to whom to apply to fit up their houses or remedy defects.

Uniform Illuminating Power.—Another very important point is constant regularity of the illuminating power of the gas. When it is anything between 10 and 20 candles, it must be as nearly uniform as possible, both day and night, if satisfaction is to be given. With good burners suitable for a definite quality of (say) 17 or 18 candles, those burners become bad and unsuitable if used with (say) 14 or 15 or with 20 candle gas. But the consumer does not know this; he commonly makes the great mistake of assuming that any burner is suitable, and that any deficiency of light is the fault of the gas.

Varieties of Coal Used. Uniformity Difficult.—Now unless one kind of coal is exclusively used, it is no easy matter to ensure uniformity. It is scarcely practicable at Nottingham; and it is certainly not advisable to confine yourselves to one quality or class of coal. You used last year five or six varieties of Yorkshire coal—all nearly equal in regard to production of gas and coke and in illuminating power. Of Derbyshire coal, there were six varieties, again nearly uniform, but lower than Yorkshire, especially in price, and five varieties of Nottinghamshire cannel were used, not varying much in the yield of gas, but considerably in yield and quality of coke; while the illuminating power of the gas from four of them was uniform (17 to 18 candles), while one was very much higher (25 candles), but producing no coke. The averages are as follows:—

	Yorkshire Coal.	Derby Coal.	Notts. Cannel.
Total quantity, tons	67,000	75,000	60,000
Price per ton (from-to).	11s. 3d. to 10s.	8s. 4d. to 7s. 2d.	8s. 2½d. to 4s. 11d.
Yield of gas per ton (from-to). . .	10,900 to 10,600	10,200 to 9600	10,300 to 9000
Illuminating power (from-to) candles	16½ to 15½	16 to 14¾	25 to 17
Coke for sale per ton of coal, cwt. (from-to). . .	10 to 9	9½ to 7	5 to 0

To reduce the illuminating power of the richer cannel and coal gas, simple water gas is used—"blue" water gas as distinguished from "carburetted." The above figures are given to me by Mr. Brown as approximate. He has also given me the weekly quantities of water gas added to the coal and cannel gas for the year December, 1904, to November, 1905. The highest percentage was in the week ending July 1 (8·77 per cent.), and the lowest Dec. 10, 1904 (1·14 per cent.). There are all quantities between these extremes; the average on Basford make, where the water gas is made, being just under 3½ per cent.

I should not like to have the task of making gas of uniform quality under the above conditions. The gas from many of the coals must be made separately, because mixing coal often spoils the coke for sale. Mr. Brown's method and orders for mixing the water gas with the coal gas cannot be improved; but there is always the difficulty of carrying out, and it may have happened, with the best intention and desire on the part of subordinates, that mistakes have been made, especially as subordinates are not likely to fully understand the great importance of uniformity of quality. In short, to send out gas always of uniform quality under the above conditions is an exceedingly difficult task, and fluctuations of illuminating power are a fruitful cause of complaints.

There has also been another cause of variation, due to some of Mr. Brown's subordinates not understanding the importance of uniformity of quality. They were anxious to show a good yield of gas—a very laudable object if pursued in the right way—but to do this they increased the suction on the retorts. There are various ways of doing this; but the effect is either to draw air into the gas, or air mixed with furnace gases. The result is that the quality of the gas is lowered, and the manager has great difficulty in discovering the cause. A few years ago, the same thing happened at the largest works of the South Metropolitan Company. The engineer soon had complaints, but could not discover the cause for some time. At last a foreman admitted that at night, in order to show good working, he had made it a practice to open a valve in the retort-house whereby air was drawn into the gas. He did not think it did any harm, though he must have known it was wrong. Another case came to my notice four or five years ago. The manager of a gas-works in a provincial town got the idea—and I have since found to my astonishment that he did not stand alone—that he was not required to supply gas of uniform quality, but that he might vary it in the day time; and to do so he increased the vacuum or suction of the exhauster, with the result that there was a considerable vacuum in the retorts, and furnace gases were drawn in through the pores of the clay retorts, and great complaints resulted. I can only imagine that there must have been more or less ignorance of the disastrous effect of this action, or no man in his senses would have acted so, to say the least, inconsiderately.

In every exhauster-house there is what is called a jet photometer—that is, a burner giving a long, single jet of flame always burning. If the gas is richer than necessary, the flame lengthens, and if poorer it shortens. The attendant has to notice this jet, and should it go too high or too low, he has first to see whether he is working at the proper vacuum at the inlet of the exhauster. If that is right, it is his duty at once to inform the foreman or manager. The vacuum at which the exhauster works is of the utmost importance, and must not cause any vacuum in the retorts, nor on any account be altered without the direct order and authority of the chief officer. Gas can be lost by allowing pressure in the retorts; but it cannot be made by causing a vacuum, and on no account whatever should a vacuum, even the slightest, be allowed in the retorts. I speak strongly because, to my astonishment, I have heard that some managers reduce the quality of their gas when too high by an extra pull by the exhauster. This does not refer in any way to your Manager, with whom I have discussed the question, and found Mr. Brown's views on the point were as strong as my own, though it appears that some of his subordinates—ignorantly, I believe, and with no evil intent—did, for a time, some harm to the gas in this way. But that is a thing of the past, and will never occur again.

Varieties of Coal versus Uniform Quality.—Still there remains the great difficulty of the varieties of coal militating against uniform quality, necessitating great care and constant attention by Mr. Brown and his assistants. The best remedy is to make gas of a quality readily obtainable from the available supply of coal. In that category, I do not class Yorkshire coals; they are too dear, and produce gas of a higher quality than is necessary. The Derbyshire coals seem the proper sort to use. I do not like cannel, especially those kinds producing the richest gas, which has to be diluted with blue water gas—a constant difficulty and risk for which the cheapness with which the mixed gas is produced is not sufficient compensation.

The Gas-Works.—As to the works, which are good and substantial, I am sorry to say their condition when Mr. Brown took charge was even in worse order than I thought when I reported in 1902. I refer especially to the retorts; and to put these right is a work of years. To the present time at Basford 33 beds out of 60 have been re-set; at Radford, 10 out of 17; and at Eastcroft, 16 out of 32. The working life of the retorts varies; but, properly set and worked, they will run six years or more. Therefore renewal cannot be made quickly, except at great expense. I was very pleased with the new settings, to which is due the improvement in the make of gas per ton, which I expect will be better in future when all the retorts are reset. The arrangement in the new settings for heating the secondary air is very good, and will I think last and save fuel. I repeat that the works, so far as structure is concerned, are thoroughly good, and capable of giving good results; but they had been allowed to run down as to condition, and it is a work of time to restore them. But it was only in the retort-houses and the governor-house that there was anything to adversely affect the supply of gas. The latter has been made all that can be desired for distributing the gas at suitable pressures to all parts of the city.

I need not refer to the commercial results of the working of the last three years, because both the Chairman of the Gas Committee and the Town Clerk told me that had been satisfactory, and that there was no complaint of the management on this ground. My only comment is that I think it might have been better to have spent some of the profit on more quickly improving the condition of the works, in addition to what has been spent for that purpose. My views on municipal trading are well known, and it would be out of place here to introduce them; but I may say that the welfare of the consumers—giving them a good

supply of gas at the lowest practicable price—should be the chief object of all gas companies and corporations supplying gas. The causes of the trouble at Nottingham are not to be found in any one great defect or mistake or failure, but in a number of relatively small defects and a mistake or two. These are all known by your management, and are disappearing rapidly. To sum them up:

1.—The reduction of the illuminating power was made too soon. For this I am partly responsible. It should not have been made until it was possible to ensure the manufacture of gas of uniform illuminating power at the works, and until the distributing arrangements—the governors and the mains—had been so far perfected that a proper pressure could be maintained everywhere. Notice of the reduction should have been given; the consumers being told that a change of flat-flame burners was necessary, and that the department would supply and fix free suitable burners. I am as strongly convinced as ever—perhaps more so—that it is a mistake to supply a high-quality gas, and that a reduction of illuminating power is to the advantage of the consumers; and the general practice is in that direction, and the general experience proves that it is right.

2.—The chief causes of the complaints seem to be: (*a*) Many burners totally unsuitable for a lower quality of gas. (*b*) The defects in the fittings of the consumers—either too small or badly laid. The first was not felt when excessive pressures prevailed, but immediately became acute when, by the districting arrangements, these pressures were reduced; the second, due to the collection of water in the fittings, was, and will be always, present until corrected as already explained. (*c*) Variation in the illuminating power of the gas supplied at times.

Everything is remediable. So much as can be done by Mr. Brown and his staff, is being done; but they can do nothing on the premises of the consumers without their consent and your authority. I do not see how good can be done to the defective fittings of the consumers without the assistance or advice of the Gas Department.

When reporting in 1902, I suggested the appointment of a Consulting Engineer, on the ground that Mr. Brown, although a man of high technical ability (which I now confirm), had no experience in the management of a large works. I think, looking back, it would have been better had some gas engineer of long experience in large works been available for reference and occasional consultation. I am not prepared to say that this is necessary now. Mr. Brown of to-day is not the same Mr. Brown that you appointed in 1902. He has had large, valuable, and extensive experience in the best of all schools—that of great difficulties and anxieties, and that, too, in connection with your own large works. He now knows probably more about the supply of gas in Nottingham than any other man in the profession; and it is therefore very doubtful whether change is necessary. It is true a Gas Committee, as is the case with a Board of Directors, cannot be expected to understand such a technical business as gas manufacture and distribution, and they may occasionally want outside advice and assistance. The appointing of a Consulting Engineer may give confidence to them and thus benefit them and their engineer or manager also; but there are two sides to the question.

Finally, everything possible should be done to help and give satisfaction to the consumers. Judging from their letters, I should think your officials are very attentive and considerate in their dealings with them. They most want information and advice; and the Gas Department, through their officials, can best supply it. The confidence of consumers can be gained, and I hope and believe that the time is not far distant when all difficulties have been overcome and the gas supply of Nottingham will give general satisfaction.

(Signed) GEORGE LIVESEY.

Yesterday's Meeting of the City Council.

At the Meeting of the City Council yesterday, Mr. E. Harlow, the Chairman of the Gas Committee, confined his explanation for his resignation practically to a criticism of the methods of the Gas Engineer, and said he resigned because the Committee would not adopt his policy. A Special Committee of the Council was appointed to investigate the whole matter, with power to terminate the services of, or appoint, any official or officials.

Lancaster Water Supply.—The net profits on the Lancaster Water-Works for the past year amount to £5764, or £846 more than those for the preceding year. The income from the sale of water was £17,188, as compared with £16,533; while the total expenditure was £200 less, The balance to the credit of the reserve fund is £10,484.

Gas-Works Accident at Oldham.—Last Tuesday an inquiry was held at Oldham into the death of Robert Snow, who was killed at the Higginshaw Gas-Works of the Corporation. James Cleaver, a steam-crane driver, said deceased worked under him. It was his duty to hook on the skips of coke, which were afterwards carried to their place by the crane. On the previous Saturday, while attending to the crane, he heard a crack, and saw the jib fall. Deceased was afterwards found underneath the stage, lying on the coke where the skips were filled. The crane and jib were examined once a week, and nothing wrong had been found. A broken pin belonging to the jib (which was the cause of the accident) was put in; and witness said it would be safer if there were two pins instead of one connected with the jib, so that if one broke there would be the other to rely on to prevent the coke-skip falling. Mr. T. Duxbury, the Gas Engineer, stated that he and Mr. Arthur Andrew, the General Manager, had written to the makers of the crane suggesting that two bolts should be put in; and they had received a reply to the effect that the makers did not see how this would strengthen the crane. In summing up, the Coroner remarked that he knew of no reason why two bolts should not be put in, so as to prevent such an accident. The Jury returned a verdict of "Accidental death."

A SATISFACTORY YEAR AT BELFAST.

Speaking at the Meeting last week of the Belfast City Council, Mr. Doran, the Chairman of the Gas Committee, said he had pleasure in presenting a very gratifying statement of the working of the department for the year ending March 31. It would be remembered that the effect of the concession of 10 per cent. discount to all consumers of less than 200,000 cubic feet per quarter, which came into force in October, 1904, was only fully felt in the past year; and as this rebate represented something like £7500 per annum, the figures he had now to submit were all the more satisfactory when this was taken into account. The summary of the profit and loss account was as follows: The gross profit on manufacture and sale of gas was £68,107, as compared with £57,680 for the previous year, or an increase of £10,427. From the gross profit was deducted interest and dividends on capital, amounting to £11,933, leaving a net profit of £56,174, as against £44,673, or a net increase of £11,501. Taking the net profit of £56,174 and adding the balance from stoves account £864, interest received from bank £518, and the balance from last year's account, £35,527, there was a total of £93,084. Out of this sum they had set aside the following amounts: Sinking fund, £5736; equivalent of interest on redeemable stock, £923; interest on insurance, £886—total, £7546. They had also made the following payments for the public good: Finance Committee, in aid of rates, £15,000; Finance Committee, new City Hall, £8499; Library Committee, £500; Parks Committee, £200—total, £24,199, leaving a balance standing at credit of profit and loss account of £61,338.

THE YEAR'S WORKING AT NANTWICH.

Reductions in Charges for Gas.

At the last Meeting of the Nantwich Urban District Council, Mr. D. H. Davies, the Gas Manager, presented his report on the working of the first complete financial year of the gas undertaking, and stated that, to say the least, the results were most gratifying. The quantity of gas made was 37,406,200 cubic feet, and the quantity sent out 37,348,200 feet. The increase in gas sent out was 2,605,800 cubic feet, equal to 7½ per cent. The coal carbonized was 3387 tons; and the average make per ton 11,043 cubic feet, of an illuminating power of 15·5 candles. The make per ton was an exceptionally good one, and was considerably above the average usually obtained by works using similar coal. The gas accounted for by consumers' meters was: Ordinary, 20,140,700 feet; gas-engines, 4,172,800 feet; prepayments, 10,067,000 feet; public lighting, 2,130,100 feet—total, 36,511,200 feet. This left an amount unaccounted for of 479,000 cubic feet, or equal to 1·28 per cent. on the make. The exceptionally low figure for unaccounted for gas had now been maintained for eighteen months; and when they took into consideration that the gas actually sold per ton was 10,779 cubic feet, it would be a very difficult matter to find a works in the United Kingdom that could beat such a record, which was one of which he felt very proud. With regard to the sale of residual products, he was pleased to say that they had been well maintained. The quantity of coke sold was 1209 tons, of tar 171 tons, and of liquor 560 tons. Owing to the early part of the winter being comparatively mild, stocks of coke in surrounding towns grew very large, and consequently gave him a considerable amount of anxiety with regard to the sale of the Council's coke, owing to the competition thus created. As to the work carried on in the distribution department, every possible effort had been put forward further to increase the sale of gas; and, taking everything into consideration, he felt that their efforts had been crowned with success. This was borne out by the fact that the increase in the gas sent out over the corresponding period was equal to 7½ per cent., which certainly augured well for the future of the undertaking. The numbers of new consumers for the year were: Ordinary, 19; prepayment, 69. The number of houses fitted up with prepayment fittings was 57, new cookers fixed 82, new services 71. The fittings department had had an exceptionally good year; and the turnover represented no less a figure than £1500.

Turning to the financial side of the past year's work, it would be seen that the gross profit earned was £4619, which was equal to 6·32 per cent. on the capital employed, the whole amount of which, however, as he had already explained, was nearly five times that of the six following towns: Birmingham, Chester, Manchester, Nottingham, Stoke, and Wallasey. With regard to the financial year already entered upon, he assumed, providing that the sale of gas and the high results were maintained, that there should be a like surplus of about £700 at the end of the year. Against this, however, they would have to bear increased burdens to the extent of about £320; the principal item being £203 increase in rates owing to the new assessment. After making allowance for this extra sum, he estimated that the net surplus would be about £380. He had carefully considered what would be the best way of dealing with this surplus, with the view of continuing and further promoting the success of the undertaking; and his opinion, based upon his experience of the town, and that of other gas-works, was to reduce the price of gas, thereby encouraging its increased use. This would naturally tend to place the undertaking in a far safer position, and to attain the end the ratepayers hoped for when the purchase of the Gas Company's works was decided upon—cheaper gas. In the first place, he wished to deal with the gas-engine consumers, whose total consumption for the past year was 4,172,800 cubic feet. He regretted to say that suppliers of coal gas for power purposes had now to face keen competition from an opponent known as "suction gas." There was no denying the fact that, if they hoped to keep their customers, and at the same time shut out suction plants, they must reduce the price to these particular customers very considerably; for once they left them, there was very little likelihood of winning them back again. Fortunately for the Gas Department, the financial results had placed them in a position to be able to offer gas-engine consumers such inducements as would, in his opinion, not make it worth their while to entertain the idea of putting down suction plants, which were

both costly and without doubt far less reliable than coal-gas engines. He had gone thoroughly into the matter; and, with a hope of killing the competition, for a while at any rate, he recommended them to make sweeping reductions to several large consumers, who might possibly entertain the idea of putting down suction plants. His suggestions were as follows: (*a*) That the price of gas for power purposes be: Consumers using under 200,000 cubic feet per annum, 2s. 8d. per 1000 cubic feet; consumers using over 200,000 feet, 2s. 6d.; consumers over 300,000 feet, 2s. 4d.; consumers over 500,000 feet, 2s. (*b*) That a reduction of 1d. per 1000 cubic feet be made to consumers of gas by ordinary meter, such reduction to be made on all rates now in operation—namely, 3s. 2d. to 3s. 9d. He had not overlooked the consumers by prepayment meter, as in his opinion they were better treated than the ordinary consumers, considering that there was only a difference of 5d. per 1000 cubic feet to meet the charges for meter and the fittings provided free by the Gas Department. He might add that the rate for slot-meter consumers was the same now as when the ordinary consumers were charged 3s. 6d.; the price to the prepayment consumers not having been raised when the ordinary consumers were increased to 3s. 9d. some five years ago. If his suggestions with regard to the proposed reductions were adopted, such reductions would absorb about £280 of the estimated surplus, thereby leaving a working margin of about £100.

In a separate report, the Gas Secretary (Mr. E. J. Fussell) said the financial position of the works on March 31 was that, after paying all working expenses, and contributing £1467 to the sinking fund for the redemption of £73,050, there remained a surplus of £703, which, together with the surplus brought forward, £809, gave them a total surplus of £1512.

After some discussion, the Council agreed to the recommendations of Mr. Davies with regard to reducing the price of gas; the Chairman (Mr. E. S. Haighton) remarking that the results obtained were a very gratifying record of eighteen months' work.

THE GAS MANAGERSHIP AT HEREFORD.

Further Petitions Presented.

At their Monthly Meeting last Tuesday, the Hereford Town Council again had before them the question of the gas managership; the matter being introduced by the Mayor (Mr. E. C. Gurney), who said he had that morning received a letter from Mr. Parlby intimating his willingness to withdraw his resignation of the position of Gas Manager, as he understood a desire existed among the citizens that he should do so. He also stated that the following further memorials (one from traders was published in the "JOURNAL" for the 8th ult.) had been forwarded to the Council.

To the Worshipful the Mayor and Corporation of the City of Hereford.

At a meeting of the Friends' First Day Adult School, consisting of 300 men—most of whom are gas consumers—held on June 3, 1906, the following resolution was unanimously passed:

"That in view of the long and successful management of the gas-works by Mr. Parlby, the perfect condition in which everything is kept, the loyalty of the employees to their Manager, and the immense financial benefit the city has, and is still receiving, we respectfully ask the Council to permit the withdrawal of Mr. Parlby's resignation, and the continuance of his able and conscientious services to the city."

Signed on behalf of the meeting,

WILLIAM H. BRUTON, President.

June 3, 1906.

Commercial Road, Hereford, June 4, 1906.

To the Mayor of Hereford.

Sir,—In asking you the favour of kindly presenting the enclosed resolutions to the Corporation, we think it right to state briefly the reason why we have held a meeting, and passed the said resolutions.

We saw in the papers the memorial which was signed by so many of the tradesmen, and other gentlemen representing the larger gas consumers and ratepayers. We regard this matter as a question for all ratepayers, and feel that we, as a body of working men, should join our voice and influence in the appeal to the Council, in the name of justice, and in the best interest of our city, to avoid, if possible, the loss which we feel would be sustained by the severance of Mr. Parlby from the gas management.

We feel sure that, as you so kindly presented the tradesmen's memorial so impartially, you will extend to us the same courtesy and favour.

On behalf of the working men's meeting,

JAMES LAMB, Chairman.

At a meeting of the employees of Messrs. G. R. Herron and Son, Limited, held at their works, Commercial Road, Hereford, on Friday, June 1, 1906 (Mr. Lamb, Manager, presiding), the following resolutions were unanimously and enthusiastically passed:—

1.—That in view of the relations existing between the City Council and the Gas Manager, we, as a body of working men and ratepayers, most respectfully ask the Council to grant the withdrawal of Mr. Parlby's resignation and the retention of his services.

2.—That as a body of men, we think that the long, faithful, and splendid services Mr. Parlby has rendered the city, in the great reductions made in the price of gas, which now stands at 2s. 6d. per 1000 feet, and the paying off a debt of upwards of £80,000 on the property, also the many advantageous developments at the works, and the excellent order in which everything is carried on, justify a generous treatment of one who has served the citizens so well.

3.—That as a body of working men, we consider that no credit appears to have been given Mr. Parlby for the additional work he had to carry out at your gas-works during the laying of the gas-mains, all of which, we believe, was done in the very worst time of the year.

4.—That in our opinion much injustice has been done Mr. Parlby by overlooking the effects of the heavy traffic over the gas-cuttings.

5 —That these resolutions be forwarded to the Mayor, signed by the Chairman, for presentation to the next meeting of the Town Council, and that a copy of the same be also sent to each of the aldermen and councillors.

Signed on behalf of the meeting,

JAMES LAMB.

In reply to a question by one of the members, Mr. Caldwell said that about 300 men were present at the meeting at which these resolutions were passed.

Mr. Bulmer observed that both before and since the last Council meeting the Gas Committee had given very serious and prolonged consideration to this matter; and he was bound to confess that he saw no reason whatever for any other line of action than that adopted at the last meeting. He begged therefore to move that these papers lie on the table.

A lengthy discussion thereupon ensued, at the conclusion of which the motion was put and carried by seventeen votes to three.

GAS PROFITS AT WEST BROMWICH.

Reduction of Charges.

In a report which was adopted at last Wednesday's meeting of the West Bromwich Town Council, the Gas Committee recommended that the net profit of £5020, reported by Mr. Thomas Hudson, the Borough Treasurer and Secretary of the Gas Department (*ante*, p. 657), should be allocated as follows: £1365 in aid of the general district rate for the current year; £750 (approximately) reserved for payment of the coke-handling plant, now nearly completed; £1000 reserved towards the cost of the proposed new stoking machinery; and the balance of £1905 carried to extensions suspense account, in reduction of the balance on that account.

The Committee then went on to say they had had under consideration the question of the present cost of making and producing gas; and in face of the competition which coal gas now had to meet, both in regard to its uses for lighting as well as for motive power, it was felt that advantage should be taken of such improvements for reducing the cost of production as circumstances permitted them to adopt. Some years ago, machinery worked by manual labour was installed in the retort-house for charging and discharging the retorts, which resulted in more efficient and economical working. Since then, however, considerable improvements had been made in this class of machinery; and the Committee were of opinion that the present stoking machinery, which was now much worn, should be superseded by plant of a more modern type. After full consideration of the question, they recommended for adoption the De Brouwer ram discharging machine and projector charging machine, to be worked by electricity, as being the best suited for their gas-works. They therefore recommended the Council to accept the tender of Messrs. Jenkins and Co., Limited, of Retford, for an installation of these machines.

The Committee had also had under consideration the prices at present charged for gas, and had resolved to reduce the price for all purposes; and they therefore recommended the adoption by the Council of the following scales, to take effect immediately after the reading of the meters for the June quarter:—

	Present Scale,	Proposed New Scale,
Prepayment consumers, per 1000 c. ft. . .	3/4	.. 3/4 less discount 5 per cent.
Gas for motive power and manufacturing purposes, other than lighting (in one building):—		
Less than 50,000 cubic feet per quarter .	2/0	.. 1/10
50,000 to 200,000 ,, ,, . . .	1/10	.. 1/8
200,000 to 500,000 ,, ,, . . .	1/7	.. 1/5
500,000 and upwards ,, ,, . . .	1/5	.. 1/5
Gas for other than the above purposes (in one building):—		
Less than 25,000 cubic feet per quarter.	2/9	.. 2/8
25,000 to 50,000 ,, ,, . . .	2/7	.. 2/6
50,000 to 500,000 ,, ,, . . .	2/5	.. 2/4
500,000 and upwards ,, ,, . . .	2/4	.. 2/3

Before the report was adopted, the Mayor (Mr. J. E. Wilson), who is Chairman of the Gas Committee, said, with reference to the recommendation of the Committee to introduce new machinery for the more economical production of gas, that they were not experimenting, but they hoped that the cost involved of £2500 would be saved through the increased economy that would result during the next four or five years. Alluding to the reductions in price proposed, he observed that the Committee had endeavoured to meet their customers all round as far as practicable. Their first difficulty was in reference to the prepayment meter consumers. These meters were fixed to supply 25 feet of gas for 1d., and it would be very difficult indeed for them to alter the 5228 coin meters in the borough. They had therefore decided to give a discount of 5 per cent. on the price to these consumers, which was exactly 2d. per 1000 feet reduction. The prepayment meter system had not been the gold mine to the Corporation that some people seemed to think. To introduce it had cost them at least £25,000; and it was being worked each year at considerable expense. As to the amount

that was paid by prepayment consumers, they had 1112 customers who took less than 20s. worth of gas per annum; so that every time the collector went to these people he received 1s. 8d. Then they had 3311 consumers of from £1 to £2 per annum, 974 who took between £2 and £3 worth a year, and 185 who took over £3 worth. Thus in the year nearly 67,000 visits were made by their collectors to prepayment meter consumers, who, however, took from them 52 million feet of gas. With respect to the substantial reduction in the price for motive power purposes, the undertaking had been hit very hard during the last year or two by the new system of suction gas. They did not fear suction gas, however, because they believed their own gas at the price that was now proposed would be quite as cheap. They wished to encourage manufacturers to take more gas from them. Even now they were an important section of the consumers, as they took 48 million cubic feet a year. The concessions the Committee were making would reduce their income in the coming year by something like £1600; but as business men they thought this was as far as they ought to go for the first step. He considered the profit of £5020 made during the year was very satisfactory, especially seeing that they had had to face extraordinary expenditure amounting to £700. The Committee had subscribed £1365 in relief of the rates; and the undertaking was now in a better financial position than it had been for many years past. The question of the capital, which a few years ago was a serious matter, had received attention, and the debt on the undertaking had been reduced from £147,220 to £142,000. This worked out at 8s. 9d. per 1000 feet of gas sold during the year. When the concern was taken over after the first year's working, the cost per 1000 cubic feet was 20s. 3d.; so they had vastly improved their position since then.

ST. HELENS CORPORATION GAS-WORKS.

The Past Year's Working.

The minutes of the Gas and Lighting Committee which were submitted at last week's meeting of the St. Helens Town Council stated that the Treasurer had submitted a balance-sheet of the gas-works for the year ending March 31 which showed a net profit, subject to audit, of £9660. This it had been resolved should be appropriated as follows: To capital account for extensions of mains and services, £1738; to extraordinary expenses (explosion, &c.), £694; to suspense account for part payment of cost of enlarging No. 3 holder, £2228; to the borough fund, as the Finance Committee may direct, £5000—total, £9660. It had also been resolved that the balance of the cost of enlarging No. 3 gasholder be paid out of the existing suspense account, and that the price of gas during the year to end March 31, 1907, be the same as that charged during the past year. This price is as follows: For lighting and all purposes other than power: When supplied through ordinary meter, 2s. 6d. per 1000 cubic feet within, and 2s. 8d. outside the borough, subject to the usual discounts. When supplied through prepayment or coin meters, 1d. per 35 cubic feet within, and 1d. per 30 cubic feet outside the borough. For power: 1s. 8d. per 1000 cubic feet within, and 2s. 2d. outside the borough, subject to the usual discounts. The holder referred to is, it may be mentioned, one to which Messrs. Clayton, Sons, and Co. have recently fixed an additional lift without adding to the guide-framing. The flying lift and the whole re-constructed holder has proved to be a very efficient job, and has provided the department with a very economical extension of their storage accommodation.

Mr. Crooks, in moving the adoption of the minutes, said he had some figures concerning the past twelve months' operations which he considered would be of interest to the Council, as everything showed that they had had another very successful year's working. In the Public Lighting Department, 61 additional lamps had been erected during the year, making the total now working 1873. Of these, 553 were on the incandescent system; and he thought it would be admitted that the town was more satisfactorily lighted than it had ever been before. There had been made during the twelve months 405,398,800 cubic feet of gas, which was more by some 12,500,000 cubic feet than they had ever made in one year. This equalled an increase of upwards of 3 per cent. for the year. The percentage of unaccounted-for gas (3·75) had been kept down to a very satisfactory figure, especially when it was remembered that St. Helens was (particularly in the outskirts) influenced by mining operations. The total amount of fuel used in the manufacture of gas, including coal, cannel, and oil, equalled 38,556 tons; and the illuminating power of the gas produced was upwards of 18 candles. The number of consumers' meters added during the year was 1093, which brought the total number of consumers' meters at work at the end of the financial year to 13,640. This number, as compared with the number of houses in the borough, would reveal somewhat the large degree in which the department were looking after the wants of the general public in the supply of light, heat, and power. The total net income from gas sold was £40,730; the sum collected from coin-meters having been £16,097, which amount (3,863,387 penny pieces) equalled in weight of coppers 34½ tons. The quantity of gas used in engines worked out to the substantial figure of 23 million cubic feet in the year; there having been 120 engines at work, of a total horse power of 1308. During the year there was an addition of gas cooking-ovens, &c., fixed of 1377, making a total at the end of the year, including all kinds of stoves, of 10,936. The profit realized was largely helped by the careful way in which the residual products were prepared and marketed; the total income from the sources of bye-products having been £16,404, which more than paid the cost of the fuel. The total amount of wages paid by the department during the year was £13,660. The net profit, after payment of all interest and sinking fund depreciation accounts was, as stated in the minutes, £9660. This result had been arrived at notwithstanding that during nine months of the year the price of gas was 1d. per 1000 cubic feet less to ordinary consumers and nearly 2d. per 1000 to consumers by coin-meters—the total amount of lessened profit owing to the reduction in price being nearly £2000, which, of course, was retained in the pockets of the gas consumers. The Committee were pleased to have been able to again devote the substantial sum of £5000 to the borough fund account—allocating the other portion of the profits to the payment of several items of extraordinary expenditure which had been incurred in the extension of the mains, gasholder, &c. This sum made, with those which had previously been devoted to the borough fund account, the total of £71,030, which had been transferred to this account since the works were taken over by the Corporation, in addition to which £38,440 had been written off the works capital account; leaving the Committee with a much more valuable works, and with a reduced burden of capital account. The total expenditure on capital account to March 31 was £315,197, of which £161,962 had been repaid, leaving £153,235 as the net debt on capital account. The Engineer (Mr. Samuel Glover) assured him that these results had been obtained while much had been done to maintain the works, buildings, and apparatus in good order and condition. In view of further necessary capital outlay, which the Committee had every reason to believe would be profitable to the concern, and the fact that the reduction in price, granted from July last year, will extend during the current twelve months, the Committee had decided to retain the price at the same figure at present. During the winter the large addition to the gasholder in Knowsley Road, which increased its storage capacity by 500,000 cubic feet, was worked repeatedly, and proved in every way a most satisfactory addition to the Committee's storage and distributing power. In conclusion, he wished to say the Engineer and his staff were to be complimented on the very satisfactory results they had attained during the past year.

Before the minutes were adopted, Mr. Hamblett remarked that in the working of the Gas Department they had a splendid encouragement of municipal trading; while the Mayor said he was sure the whole of the Council congratulated the Committee, the Gas Engineer, and all associated with him on the very excellent results which had accrued to the town from the past year's operations.

DUKINFIELD CORPORATION GAS SUPPLY.

The Past Year's Working.

The annual report of the Manager (Mr. William Lindley) on the operations of the Dukinfield Gas-Works during the past twelve months, states that the gas-making arrangements were satisfactory; the yield per ton having been 11,304 cubic feet, and the total sale over 80 millions—or an increase of 5 millions above the preceding year. At the same time, the leakage shows a slight reduction. The net trading profit is £814; and though there is a diminution in the amount spent on repairs of works, and also on repairs of mains, services, and meters, everything has been kept up to its full state of efficiency. The new retorts and retort-house (commenced in 1904) have now been completed, at a cost of £3108. They have been worked during the whole of the past winter season, and have given every satisfaction.

The quantity of gas made was 90,865,000 cubic feet, of which 81,227,400 feet was sold; the percentage of unaccounted-for gas being 10·6. The gas accounted for was apportioned as follows: Cottages, ordinary meters, 39,347,600 feet; do., prepayment meters, 8,129,300 feet; mills, 26,570,850 feet; public lamps, 5,875,842 feet; gas office, works, &c., 1,303,808 feet. The cost of coal was £4540, compared with £4354; and the total expenditure was £9452, as against £10,092. The receipts were £13,491, compared with £13,145; and there was thus a gross profit of £4039, as against £3053. From this, of course, has to be deducted annuity, interest, and sinking fund charges, &c., after which a net profit, as already stated, is shown of £814, which compares with a loss on the previous year of £166.

The income items in the present accounts are: Gas-rental, £10,709; meter-rental, £25; coke, £1561; tar, £608; sulphate of ammonia, £576; and carbon, £11. The price of gas is 2s. 9d. per 1000 cubic feet, varying, according to consumption, 1d. to 5d. below this charge; while meters are supplied free to consumers of less than 50,000 cubic feet per quarter.

In view of the satisfactory character of the report, the Committee decided to ask the Council to forthwith make a reduction of 2d. per 1000 cubic feet in the charge to ordinary and slot consumers; and this the Council have agreed to. For the present, therefore, the price will be 2s. 7d.; but the prospects for the coming year are so excellent that the Committee are hoping that even a further reduction may become practicable in the not far distant future.

WORKINGTON GAS DEPARTMENT.

The Manager of the Workington Corporation Gas Department (Mr. George Keyte) lately presented his report on the results of the working of the department in the twelve months ending the 31st of March last. It was accompanied by the accounts, prepared by the Borough Treasurer (Mr. John Noble), which showed that the net profit was £1562, being an increase of £117 upon that for the previous year. The expenditure amounted to £13,041, and the income to £16,858; showing a gross profit of £3817, against £3779 before.

During the year a considerable number of the original 2-inch mains in the older portion of the town were replaced by others of larger size. The cost of this work was a heavy item of the year's expenditure. Consumers to the number of 265 were added during the year; the total having increased from 3285 to 3550. Mr. Keyte closed his report by submitting a few figures showing the growth of the gas undertaking in the last five years. During that period, the number of consumers increased from 2332 to 3550; being an addition of 1218, or upwards of 52 per cent. This was made up of an increase of 1230 slot meter supplies, and a decrease of 12 ordinary meter supplies. The output of gas had increased from 77¾ million to 101½ million cubic feet, or over 30 per cent. He pointed out that the development of the business had necessitated a large total expenditure during the five years. The items included the extension of the retort-house, the increase of nearly 100 per cent. in retort power; main renewals and extensions equivalent to nearly 25 per cent. of the total mileage; the provision of service

pipes and slot meters for upwards of 1200 additional consumers; the fitting up of 303 houses with complete slot installations, including cookers; and the provision of 317 additional high-grade cookers on hire—there being 52 on the books at the beginning, and 369 at the end of the period. Notwithstanding the large outlay involved in these and other requirements, the net total indebtedness of the undertaking on the capital and revenue accounts amounts to only £19,734, compared with £22,179 five years ago. Mr. Keyte thinks the Committee and Council are to be congratulated upon being responsible for the management of an undertaking which can expand so freely without the usual adjunct of increased indebtedness, and permit of steadily reducing the price charged during the period under review from 2s. 11d. successively to 2s. 8d., 2s. 6d., and 2s. 4d. per 1000 cubic feet, and doubling the maximum discounts for large consumptions.

The following is the working statement for the past year: Gas made, 101,434,000 cubic feet; gas sold, used on works, &c., 93,417,000 cubic feet; gas unaccounted for, 8,017,000 cubic feet, or 7·9 per cent.; Cumberland coal and cannel carbonized, 9817 tons; average make of gas per ton, 10,332 cubic feet; coke for sale per ton of coal, 8·57 cwt.; tar do., 11·9 gallons; sulphate of ammonia do., 26·92 lbs.

GAS-WORKS RESULTS AT LANCASTER.

Mr. C. Armitage, the Manager of the Lancaster Gas-Works, in his report for the year ending March 25, says that the total receipts, including bank interest (less commission), amounted to £28,201, and the expenditure to £19,039; leaving a gross profit of £9162. This had been carried to net revenue account, and disposed of as follows: Interest on stock and mortgages, £3809; redemption fund, £1619; income-tax, £473; borough fund, £1000; reserve fund, £2261. The reserve fund now amounts to £10,992, and the redemption fund to £27,368. Nothing was added to capital account during the year; but the following items were charged direct to revenue: New mains, services, meters, and prepayment stoves, £888; new chimney, £686; and new scrubber-washer, £430.

The receipts for gas through ordinary meters were £14,439, or an increase of £426; while a further increase of about £395 would have been recorded except for reductions in price. There are now 2515 prepayment meters fixed; and the receipts for the past year from this source amounted to £4472, or an increase of £204. About 15¼ million cubic feet of gas was supplied to the public lamps free of charge, representing a sum (at 2s. per 1000 cubic feet) of £1520. The average price received per 1000 cubic feet of gas sold was 2s. 0·16d.; the net cost of the gas being 10·61d. The average cost of coal was 11s. 0·8d. per ton, as against 11s. 11·89d. in the preceding year. Coke contributed in return 4s. 11·12d., and products from tar and ammoniacal liquor 3s. 9·15d.—making a return for residual products of 8s. 8·27d. per ton of coal carbonized, or 78·51 per cent. of the cost of the coal. The adoption of stoking machinery has resulted in further reducing the cost of production. A coke-conveyor is now being erected, in addition to alterations to furnaces, which will further reduce the cost of fuel and labour.

When the report came before the Council, Alderman Bowness, the Chairman of the Gas Committee, remarked that they were under great obligation to Mr. Armitage for the skill and attention he had given to the undertaking.

PRICE OF GAS AT BURY.

Referring in the Bury Town Council to the gas undertaking, the Mayor (Alderman Fletcher) said that they estimated in the coming year a profit of £6000. The initial price of gas had not been altered, as the Committee felt the present was not an opportune time for this to be done. The only change they had made was to consumers for power, and all who used over 100,000 cubic feet per quarter—initial price, 1s. 10d. per 1000 cubic feet, or, after discount and share of profits, 1s. 7d. To those who consumed 500,000 cubic feet, the initial price would be 1s. 8d., and the net price 1s. 5d. Four tests had been made, and it was found that this worked out at a little over ¼d. per brake horse power.

Alderman Ashworth said that a very handsome profit was made last year—£7197; and half of this had to go in aid of the rates. So large a profit on the gas was not justified. The largest consumers of gas were the smallest ratepayers; while large ratepayers were often the smallest consumers of gas. The result was that, when they put half of the gas profits to the rates, the largest ratepayers and smallest users of gas benefited to a greater degree than ratepayers who used a larger amount of gas. Mr. Harrison agreed with Alderman Ashworth, and thought they might let cooking-stoves free. Mr. Battersby, however, asked the Council not to be led away by Alderman Ashworth's sophistry. He said that this year they had had to increase the rates 1d. in the pound. For each reduction of 1d. on the gas, they had 1d. on the general rates. People who were considering the erection of mills looked at the rates and not at the price of gas. The price of gas was lower in Bury than in any other town except Widnes. Dr. Greenhalgh said he was in sympathy with Alderman Ashworth. It was the people who produced the profit who ought to get it. Mr. Hardman pointed out that, in the summary of estimates, the loss on the Joint Water Board was considerably over £4000, the profit on gas £3000, and the profit on electricity £1000. The profit on gas and electricity together did not cover the loss on water; and when considering this, they must put the whole trading concerns together.

The Mayor, replying, said the gas was sold at a very low rate, and the minutes were then adopted.

It is reported that at St. Helens consideration is being given to the advisability of doing away with electric lamps for lighting the main streets. Both the gas and electricity supply are in the hands of the Corporation.

MIDDLETON CORPORATION GAS SUPPLY.

The Past Year's Progress.

At the last Monthly Meeting of the Middleton Town Council, the Chairman of the Gas Committee (Mr. Mills) presented the minutes of the Committee, and moved their adoption. He apologized for the statement of the working of the gas undertaking not being ready, but said he was in a position to inform the Council that the quantity of gas made was 126,758,000 cubic feet, and the quantity sold 115,982,700 cubic feet; leaving 10,775,300 cubic feet, or 8·5 per cent., unaccounted for. Last year the amount was 8·49 per cent. The total profit on the year's working was £1017, leaving an adverse balance of £3234 still to be wiped off. Neither he nor the members felt satisfied with the result, and a very considerable change would have to take place; and he trusted the Committee would have the grit to take the necessary steps to secure more efficient management, regardless of any interest except that of the Corporation and their customers. Mr. Howard asked if the Committee had done anything in the matter of abolishing the charges for the hire of stoves and meters. He understood a report was being prepared on the matter, and he would like to know when it was likely to be presented. Mr. Mills said he did not know. The Mayor (Alderman Aspell) thought that the Council should be placed as early as possible in possession of the figures which were to be contained in the report. Mr. Mills said that if the figures were found to be right, he could promise that at the next meeting but one of the Council the report would be brought before them. Mr. Partington said it was a remarkable thing that the Committee could not have the figures before them sooner. A change ought certainly to take place. Either the Chairman or the Committee should be shifted. Mr. Mills said he himself had for the last nine months been pressing for inquiries to be made. The minutes were then passed.

TEIGNMOUTH GAS UNDERTAKING.

Mr. J. A. Gray, the Manager of the Teignmouth Gas-Works, presented his annual report at a meeting of the District Council last Tuesday. In it he said that the balance-sheet showed a net profit for the year of £375 16s. 11d.; the gross profit, including the sums paid for interest and sinking fund on loan account, amounting to £1725 3s. 8d. The credit balance on revenue account, which stood at £141 0s. 5d. at the commencement of the year, had increased to £516 17s. 4d. The financial position had steadily improved each year since 1903, when there was a deficit of £1283 14s. 8d. Though the profit produced by the financial year's operations was considerably short of that of the previous year, the difference was practically wholly accounted for by the reduction in the selling price of gas, and by the fact that considerable expenditure was incurred which could only be classed as extraordinary. The total quantity of gas made was 30,543,930 cubic feet—an increase of 6·99 per cent. on the previous year. Of this quantity, 23,349,600 cubic feet were consumed by private consumers, an increase of 6·42 per cent. on the previous year. The recent introduction of slot-meter installations had been attended with gratifying results, and could not fail to add very considerably to the gas consumption. During the past two months, 47 ordinary cooking-stoves had been fixed on hire and 167 slot installations fitted up. Many applications had still to be dealt with. The gas-producing plant at the works was well able to meet the increased demand; but the new gas-holder would require to be telescoped at no distant date, as the storage capacity was somewhat limited. Mr. Gray pointed out that the unfortunate situation of the works effectually operated against the disposal of any of the residual products at really satisfactory rates; and, in concluding his report, he said that when it was remembered the Council had reduced the price of gas by 9d. per 1000 cubic feet in four years and the public lighting by £250 per annum, cleared off a large deficit on the revenue account and built up a working balance, as well as considerably extended the mains without contracting fresh loans, there was reason to believe that the financial position of the gas undertaking would become more satisfactory year by year and a greater source of advantage to the ratepayers. The Council expressed their gratification with the report, and decided to further reduce the price of gas as from March 31 from 3s. 10d. to 3s. 8d. per 1000 cubic feet.

LINCOLN GAS AND WATER SUPPLY.

At the Meeting of the Lincoln City Council last Tuesday, the results of the working of the gas and water undertakings of the Corporation for the year ending the 31st of March were submitted.

The statement with respect to the gas-works set forth that the year's working had resulted in a gross profit of £12,153; the net profit, after deducting £7712 for sinking fund and interest charges, being £4441—a decrease of £493 as compared with the preceding year. There had been an increased income of £814, and an increased expenditure of £1307. The full effect of the reduction in price, from 2s. 3d. to 2s. 1d. per 1000 cubic feet, had now been experienced; but in spite of this the income from that source was £931 greater than before. It was coke and tar which showed decreases, owing to the low prices. Adding the credit balance from the preceding year, there was a sum to appropriate of £5993, of which £4000 had been applied in aid of the rates.

In moving the adoption of the minutes, Alderman Wallis, the Chairman of the Gas Committee, said that, at the outset, the Committee told the Council that they would receive very much less for coke, and they found this was so for the first part of the past year, but better prices were received later on. They had looked for a decrease of some £600 on this head; and the actual decrease was £270. The report of Mr. Carter (the Manager) showed that the gas sold was 333,979,000 cubic feet; which was 20,872,000 cubic feet less than the make, which was accounted for by leakage. This, however, was only 5·8 per cent. The

coal carbonized amounted to 28,216 tons, against 26,957 tons in the preceding year. The oil used was 99,031 gallons, compared with 94,438 gallons; and the gas made per ton of coal was 11,075 cubic feet, against 10,906 cubic feet in the preceding year. The new consumers added numbered 470, contrasted with 155; the total having risen to 10,314. Besides making the £4000 contribution to the rates, they had reduced the price of gas. Alderman Wallis paid a cordial tribute to Mr. Carter and the staff (who, he said, all worked harmoniously with the Committee), and concluded by stating that they should keep the concern in a perfectly satisfactory state of efficiency. At the same time, the Committee had very great sympathy with their Chancellor of the Exchequer, and would do all they could to have this year a similar contribution to the rates. Mr. White, in seconding the motion, congratulated the Chairman on the excellent report he had presented. The minutes were confirmed.

The year's statement in regard to the water undertaking set forth that abnormal conditions had prevailed during the year, and much expenditure of a special character had fallen upon the revenue account, with the result that the deficiency on the 31st of March last was £11,947, in addition to the expenditure of a balance in hand of £1825; making a total deficiency of £13,772, compared with a deficiency of £545 in the preceding year. A sum of £4000 of this deficiency was included in the general district rate estimated for the current year. The statement contained particulars of the deficiency. The total income for the year amounted to £14,979—an increase of £1144 compared with the preceding twelve months; £1109 of it being due to the inclusion of an additional quarter's income from the supply by meter, as the accounts under this head had been brought up to the 31st of March. The capital expenditure for the year had been £10,696, of which £6230 was for boring. The total capital expenditure upon the undertaking amounted to £143,263; and the total loan debt (including the overdraft on capital account) was £92,490.

In moving the adoption of the minutes of the Water Committee, Mr. Ruddock stated that the boring for the new water supply was proceeding satisfactorily. It was at a depth of 1563 feet with the 3-inch bore; and now the larger bore was at a depth of 1549 feet, which left 14 feet to reach the depth of the 3-inch bore. There were 600 feet of water in the well, and there was more to follow. By the end of the week they expected to be down the 14 feet; and there would be greater progress when they reached the sandstone. The minutes were confirmed.

BRUSSELS MUNICIPAL GAS SUPPLY.

Report of the Gas Committee for the Past Year.

According to the report presented to the Municipal Council of Brussels by the Gas Committee on the working of the gas undertaking in the year ending the 31st of December last, the total quantity of gas produced was 45,489,240 cubic metres, or about 1605¾ million cubic feet, compared with 44,140,550 cubic metres, or 1558 million feet, in the preceding twelve months. The entire bulk of gas was disposed of as follows:—

	Cubic Metres.
Lighting	29,165,355
Municipal and other establishments	1,588,894
Gas-engines	4,155,468
Heating purposes	4,744,366
Illuminating devices, balloons, &c.	122,119
Artisans' dwellings and miscellaneous	209,955
Total sold	39,986,157
Public lighting and illuminations	2,882,083
Used on the works, &c.	1,732,155
Unaccounted for	888,845
Total production	45,489,240

The total receipts amounted to 7,105,455 frs. (£284,218), and the expenses to 4,206,884 frs. (£168,275); leaving a balance of 2,898,570 frs. (£115,943). Deducting for depreciation in the value of the stores 79,320 frs. (£3173), there was a net balance of 2,819,250 frs. (£112,770), against 2,398,135 frs. (£95,925) at the end of 1904.

The portion of the report dealing with the manufacturing operations shows that 118,940 tons of coal were carbonized and 4110 tons of oil were employed for enrichment, &c., last year, compared with 109,454 tons of coal and 4182 tons of oil in 1904. The sale of coke was regular during the year; and at the close there was none in stock. Tar and sulphate of ammonia were disposed of advantageously; but the market for cyanides was anything but what could be desired. As usual, a large quantity of the breeze was utilized in the manufacture of compressed fuel, which is employed for heating the retorts and boilers. Nearly all the ashes produced on the works were sold for making mortar and repairing the roads. Extensions of the manufacturing and distributing plant caused an expenditure of 570,642 frs. (£22,825); increasing to 31,188,321 frs. (£1,247,533) the total capital employed.

During the twelve months covered by the report, 387 interior installations were put in, bringing up the total to 14,522; and 1525 additional meters were fixed, making 38,384 in use. The rising mains were increased by 260; bringing the total up to 5912. Gas-stoves on hire number 26,115; and the gas-engines in use, 415. For public lighting 6754 lanterns are employed.

Bury Joint Water Board.—The Treasurer to the Bury and District Joint Water Board (Mr. R. W. Buxton), in issuing his accounts for the year ending March 31, says that the loss on this occasion is £10,227, or £1668 less than was estimated. In view of the heavy expenditure the Board are committed to, in the construction of two reservoirs, the purchase of a gathering-ground, and the completion of some filters, the loss for the year ending March next cannot be estimated at less than £11,920. The deficiency has, of course, to be met by the constituent authorities. The Manager (Mr. R. Rigby) says the total population supplied last March was about 156,084.

GERMAN GAS AND ELECTRICITY COMPANIES.

The Directors of the Gas, Water, and Electricity Investmen Company, of Berlin, state in their report for 1905 that the Company own twelve gas and one electricity works, and that the undertaking further developed in a satisfactory manner during the twelve months covered. A material increase in the consumption of gas again took place, especially in regard to its utilization for working and heating purposes. In the case of the electricity works, the financial results were favourable on the whole, though the sale of current slightly declined. The net profits for the year amounted to £10,724, compared with £6889 in 1904; and a dividend has been declared at the rate of 5½ per cent. on £150,000, contrasted with 5 per cent. on a share capital of £100,000 in the previous year.

The report of the Directors of the Gas and Electricity Company of Cologne states that the consumption of gas last year increased by 6·7 per cent., the number of consumers advanced from 12,704 to 14,036, the gas-engines supplied from 549 to 597, and cooking and heating appliances from 7635 to 8593. After meeting working expenses and again writing off £12,500 for depreciation, the accounts show net profits to the amount of £31,473, compared with £25,160 in 1904. The Directors have declared a dividend at the rate of 6 per cent., against 5½ per cent. before.

The Directors of the Silesian Electricity and Gas Shares Company of Breslau, in the course of their report for 1905, state that satisfactory results attended the business during the twelve months ended Dec. 31 last. In the case of the electricity works, a surplus over working expenses was obtained amounting to £71,583, compared with £60,493 in 1904; and fresh applications for a supply of current to the extent of 3000 kilowatts were received. The business of the gas-works at Glogau developed in a regular and satisfactory manner, and there was again a large increase in the consumption of gas. The prices of coal and coke were somewhat higher; and tar and sulphate of ammonia had to be sold at lower rates. The surplus realized from the gas-works was £7393, against £7234 in 1904; so that the total from the gas and electricity works amounted to £78,976. After meeting interest charges, appropriating the share of profits due to the Local Authority, paying the charges under agreements with the towns and consumers supplied from the Upper Silesian Electricity Works, and setting aside £29,000 for depreciation of investments, against £23,750 in 1904, there remained a balance of net profit of £31,348, compared with £24,673 the preceding year. This sum allowed of the distribution of a dividend at the rate of 8 per cent. on £330,000, contrasted with £255,000 in 1904 at the same rate.

THE NEW RESERVOIR AT TORQUAY.

A Largely Exceeded Estimate.

A report dealing with the financial position of the Corporation in reference to the new reservoir which they are constructing in the Trenchford Valley, was presented to the Torquay Town Council by Mr. S. C. Chapman, the Water Engineer, last Tuesday. The original estimate of the cost of the works was £21,238, with, in addition, £762 for land and parliamentary costs. A loan of £22,000 was accordingly obtained. Subsequently, a second loan of £20,637 was raised; this comprising £14,346 for the works, £1350 for additional works, £1804 for land, and £3137 the cost of the Act of Parliament. These brought the total amount of the money obtained for the reservoir to £46,637; and it was estimated that £14,359 would be required to complete the work—making the total cost £59,996. The Water-Works Committee, in view of this report, recommended that the Local Government Board be asked to sanction the obtaining of a further loan of £14,400.

Mr. F. J. Crocker, the Chairman of the Water Committee, in proposing the adoption of the recommendation, said that although there was a very large increase in the cost of the works as compared with the original estimate, the new reservoir would be a magnificent addition to the water-works, and it was one which was absolutely necessary for the welfare of the town and to enable them to maintain a constant supply. In the main, the increase was due to unforeseen difficulties in the cutting of the trench, and to the exceedingly heavy cost of making roads in the neighbourhood of the reservoir. As to the trench, the excavation was so difficult that it was almost like mining. Mr. E. Hutchings complained that the Water Committee had not made an earlier disclosure of the actual facts of the case. Many ratepayers did not believe there ever was, or in the immediate future ever would be, any real occasion for incurring this enormous outlay. Some years ago there was a manufactured and engineered outcry of a scarcity of water, but at that time there was only the least danger of the supply falling short of the demand. When the scheme was brought forward, they were engaged in a game of bluff with Teignmouth. It was thought that, by going in for this additional reservoir, Torquay could secure that which would prevent Teignmouth from going on with the Hyner water scheme, which was then in contemplation. If there had been no question of supplying Teignmouth with water, there would have been no question of this enormous outlay. Of course, they would have to complete the reservoir; but when the original estimate of £22,000 resolved itself into an actual expenditure of £60,000, they could not expect the ratepayers to have much confidence in those who were carrying on the business undertakings of the town. Where were they going to get additional customers to share the burden of the enormous capital outlay? Was it a fact that as soon as the reservoir was completed they would have to consider the question of laying a new main at a cost of £40,000?

Mr. W. Kerswill asked for an assurance that the sum now proposed would be sufficient to complete the work, and said that, instead of the water-works easing the rates, as had been foreshadowed at one time, the reverse was the case. Was it not possible to carry out the work in sections, and so postpone some of the capital expenditure? Mr. J. Young said they could not stop half way in constructing an embankment. They must go on with the work, though he was not satisfied

that the £14,400 as now asked for would be sufficient to complete it. It was a mad scheme, never required, and only brought forward, as Mr. Hutchings had said, to spite Teignmouth. Mr. E. Pike contended that the Council had been wofully misled, and said that if the town had been asked originally to sanction an expenditure of £50,000, as they ought to have been, the scheme would never have been embarked upon. Mr. Rockley did not believe that any such unworthy motives were entertained with regard to Teignmouth as had been suggested. The Mayor (Mr. J. Smerdon) believed the additional £14,400 would be sufficient to complete the works. Mr. Crocker said it was not true that the inception of the scheme had anything to do with the Teignmouth water supply. When it was brought forward, they were within ten days of the Torquay supply running out. No new main was contemplated for a few years at any rate.

The recommendation of the Committee with reference to the additional loan was agreed to.

A WATER SCHEME FOR BIRKENHEAD.

Proposal to Go to North Wales.

Six years ago, the Birkenhead Gas and Water Committee appointed a Special Sub-Committee to inquire into, and report upon, the present and future water supply of the borough; and three years later they presented an interim report, in which, after discussing at length the capacities of the existing sources of water supply, and estimating the probable future requirements, they urged that steps should be taken without loss of time to secure an extended and permanent supply. This report was adopted by the Council; and the Sub-Committee were instructed to resume their inquiry, with a view to determining from what source or sources the future permanent supply should be derived. They have now completed their labours, and have drawn up a voluminous report, which embodies a plan prepared by Mr. G. F. Deacon, M.Inst.C.E., who was consulted, and asked to submit a "practicable water scheme which would supply Birkenhead with 6 million gallons of water per day, and could in future be extended so as to supply the borough with an additional 4 million gallons a day."

After consideration, a gravitation scheme submitted by Mr. Deacon was provisionally adopted by the Sub-Committee. According to this proposal, on area "A," comprising 6500 acres, will be constructed a reservoir capable of containing 2100 million gallons. This reservoir will be able to supply 8·1 million gallons of water a day to Birkenhead, as well as the usual compensation water to the stream on which it is situated. At the time of the building of the reservoir, there would also be constructed filter-beds, the aqueduct to Birkenhead, with its balancing tanks, capable of conveying 7 million gallons a day, and an additional service reservoir near to Birkenhead. From the reservoir "A," it is proposed to supply to Birkenhead 7 million gallons a day in the first instance; and the estimated cost of these works, including the purchase of the site, a second reservoir "B," and a third reservoir "C," amounts to £740,000. When the demand for additional water beyond the 7 million gallons arises, it is proposed that a second reservoir "B" shall be constructed on land purchased for the purpose under the first part of the scheme above mentioned, within the area "B," which adjoins the gathering-ground draining into the reservoir "A."

The reservoir "B" will be capable of containing 1700 million gallons, and will be of sufficient capacity to supply 5·9 million gallons of water a day, together with the proper quantity of compensation water. It is then proposed to take the whole of the 5·9 million gallons from reservoir "B," together with the balance of water from reservoir "A" (which is 1·1 million gallons a day), making a second instalment of 7 million gallons a day, and to supply this second instalment to Birkenhead. At the time of the building of reservoir "B," will also be constructed the necessary filter-beds, a second line of pipes capable of conveying 7 million gallons daily, and the necessary additional service reservoir near Birkenhead. The cost of this second instalment of works is estimated at £545,000; so that the total cost of the two instalments of reservoirs "A" and "B" will be £1,285,000. If after the lapse of many years further supplies, in addition to the two instalments already described, are required, it will be possible, after the construction of a third reservoir "C," on a gathering-ground immediately adjoining the areas "A" and "B," to take from the "A" and "B" reservoirs an additional quantity of 4 to 5 million gallons daily at an extra cost of £464,000. Thus the total quantity of water available from these proposed sources of supply would be 18,660,000 gallons a day; and the cost of the whole scheme would be £1,749,000.

The gathering-grounds are situated in North Wales; and the sites of the proposed reservoirs, streams, and the line of aqueduct from the source to Birkenhead, were examined by Mr. Deacon. The sites of the reservoirs are, Mr. Deacon says, among the most favourable he has ever seen. Professor Boyd Dawkins agrees with the conclusions of Mr. Deacon, and thinks the site for the reservoirs has been selected with great judgment. Sir Alexander Binnie has congratulated the Committee on having had placed before them one of the best schemes which it had been his duty to review for many years. Great care has been exercised to keep the site a secret; and even now no more definite information is available to the outside world than that it is "somewhere in North Wales."

The Borough Treasurer, dealing with the scheme, remarks that the cost of the delivery of 5 million gallons per day had been estimated at £700,000; a further 5 million gallons per day being obtainable for an additional outlay of £350,000. The annual cost would be as follows: Interest (at 3¾ per cent.) and sinking fund (60 years—2½ per cent. basis) on an outlay of £700,000, £31,400; maintenance of new works at 1 per cent., £7000; existing works for a daily supply of 2 million gallons, £25,000—total, £63,400. On the present scale of charges, the income derived would amount to approximately £35,000; the extra sum to be

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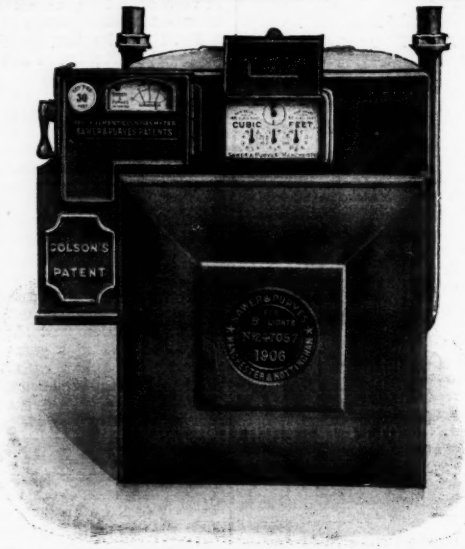

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provided thus being about £28,000, which would necessitate an increase in the rates of charge of almost 85 per cent.

A special meeting of the Council will be held to discuss the scheme; but meanwhile the members have been invited to visit the locality. The inspection will take place next Saturday; and then, of course, the precise spot chosen for the scheme must be disclosed.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The gas-coal contracts of the Corporation of Glasgow are creating some stir in coal circles. In the "Glasgow Herald" of Thursday, it was intimated that the Gas Committee were to have met the previous day to consider the tenders submitted by coalmasters and merchants some little time since for the supplies of coal for gas-making purposes over the ensuing season, but that, owing to the absence of the Gas Engineer, the meeting was adjourned for a few days. Then it was added: "It was rumoured on 'Change that one of the members of the Committee intended to propose that, in consequence of the easier tendency developed in the coal market since the tenders were lodged, it should be resolved to advertise for fresh offers, in the hope of getting these at lower prices. Naturally this report met with a considerable amount of adverse criticism in coal trade circles." To-day the same newspaper publishes the following, under date of Friday: "At a meeting of the Glasgow Corporation Gas Committee held to-day, it was resolved, in consequence of the reactionary tendency displayed by the coal market of late, to advertise for fresh offers for coal for gas-making purposes. This altogether unusual action on the part of the Gas Committee, which was agreed to by a majority of 5 to 3, is very much resented by coalmasters and merchants who had sent in tenders. The matter was the subject of much comment in coal trade circles in the afternoon. Coalmasters naturally felt that, had the market strengthened, instead of having weakened, in the interval which has elapsed since their offers were lodged, there would have been no suggestion of asking for amended terms."

On the evening of Monday last, Bailie Douglas was the author of a somewhat ungracious attack upon Mr. W. R. Herring, of Edinburgh. The occasion was the delivery of an address to a small meeting of a Ward Committee. The Gas Commissioners, he said, were particularly fortunate in having such an able man as Mr. Herring as their Gas Engineer. However much they differed from him upon many points, they must admit that he was a capable and thoroughly efficient official. He had got hold of the Gas Commissioners in a way few men could have done. To put it frankly, he simply held the majority of the Gas Commissioners in the hollow of his hand. This ought not to be. There were many reasons why he said so. Among these were the salary which is paid to Mr. Herring, and his being allowed to do outside work. In connection with the latter, the suggestion was made that whatever Mr. Herring receives as a consulting engineer should be placed in a fee fund, and be applied for the benefit of the clerical staff of the Gas Commission. It would be altogether in the same line as this proposal if the Gas Commissioners were to hire out Mr. Herring's services, charge the fees, and pay him a commission upon them. This illustrates the absurdity of the notion.

I wonder when a satisfactory solution of the problem of how to light the streets of Edinburgh will be arrived at? A Sub-Committee this week reported to the Lighting Committee suggesting the advisability of extinguishing every alternate lamp at midnight, where the consumption is more than 2 cubic feet per hour, as is done with the electric arc lamps. The Sub-Committee also suggested that the number of lamps fitted for the 2 cubic feet consumption should be considerably increased beyond the number hitherto proposed in the Council. It was suggested that a room should be fitted up in the Corporation Buildings, for the testing of the illuminating power of the gas and the voltage of the electric light current. The Committee continued consideration of these proposals.

The proposal to grant an honorarium of £200 to Mr. S. Milne, the Gas Manager, for his services as architect of the electric lighting station at Ferryhill, was moved in the Aberdeen Town Council on Monday, by Mr. G. Kemp, the Convener of the Gas and Electricity Committee. He stated that the electric lighting station cost £32,221. If they had employed an outside architect, his fee would have amounted to at least £1600. The honorarium was agreed to by 27 votes to 3.

The question of granting an honorarium to the Gas Manager has also been raised in Dundee, where it is proposed that £100 be voted to Mr. A. Yuill, on account of the remarkable success of the gas undertaking, the credit for which is largely due to him. The proposal was made at a joint meeting of the Gas, Electricity, and Finance Committees of the Town Council which was held on Monday. It was carried by 10 votes to 9, and was passed on to be dealt with by the Town Council when they are considering the annual accounts of the Gas Department. A question as to the method of borrowing money on short loan having been put, Treasurer Ritchie said it referred to a sum of £2000, which was not his money, but was in his hands for investment, and which he had lent to the department for not less than three months at 3½ per cent. interest. The late Gas Treasurer came to him and represented that the gas account was overdrawn, and that it was desirable that money should be borrowed on the most advantageous terms. He informed the Treasurer that he had the £2000, and that he had been offered 3½ per cent. for it. He agreed to lend the money to the Gas Commission at the same rate, which thereby saved 2 per cent. to the gas undertaking.

The Directors of the Bothwell and Uddingston Gas Company, Limited, in their annual report, state that the balance at the credit of the revenue account, after charging all renewals, depreciation, and bad debts, amounts to £2791. The sum at the credit of the profit and

loss account, including a balance of £785 from the previous year's account, is £3439. They recommend payment of a dividend of 10 per cent., absorbing £2300, and that the balance of £1139 be carried forward. There was no capital expenditure during the year. The amount allowed for depreciation was £860. The quantity of gas sold was 50,448,200 cubic feet, which at 2s. 11d. per 1000 cubic feet, brought in £2362. A sum of £29 was received for the hire of stoves. Residual products realized £5123, of which £2910 was derived from coke, £758 from tar, and £1455 from sulphate of ammonia. Coal cost £3273, purifying materials £125, and cartage £845. Repairs and maintenance cost £671; distribution of gas, £654; feu-duty, rent, and taxes, £646; and management, £368. The total revenue was £12,569. The reserve fund amounts to £895, and the insurance fund to £1150. The quantity of coal carbonized was 10,208 tons. The yield of coke was 6530 tons, of which 781 tons were used in manufacture. The yield of tar was 120,800 gallons, and of sulphate of ammonia 124 tons.

The Pitlochry Gaslight Company have paid a dividend at the rate of 5 per cent., as compared with 4 per cent. last year. They have also reduced the price of gas from 7s. 6d. to 7s. 1d. per 1000 cubic feet, for ordinary purposes, the price for cooking and heating to remain at 5s.

I have this evening received from Mr. G. Braidwood, of Dawsholm, the Secretary of the Scottish Junior Gas Association (Western District), a copy of the "Transactions" of the Association during the past session. It is a neat little booklet, extending to over 70 pages, and is published by the Association. The list of members shows 14 honorary and 109 ordinary—a very satisfactory number.

CURRENT SALES OF GAS PRODUCTS.

Week ending June 9.

There is little or no change to report in the London market. Makers are well sold in pretty well all products, so that there is not much doing at the moment. Crude carbolic acid is perhaps hardly so strong, without any actual change in price. Creosote is in an improving position. Sulphate of ammonia remains about the same, and may be called £12 5s. on Beckton terms. Stocks are small, and the make is, of course, nearly at its lowest; so that makers are comfortable.

Sulphate of Ammonia.

LIVERPOOL, *June* 9.

Holidays have to some extent interfered with the business of the week; but, apart from that, demand has been slack, and prices have again given way. The closing quotations are £11 17s. 6d. per ton f.o.b. Hull, £12 nominal per ton f.o.b. Liverpool, and £12 per ton f.o.b. Leith. Home demand is practically over, Japanese buyers are for the most part hanging back, while Spain and the Continent are quite off the market. So that, although production is nearing its minimum, makers are finding it somewhat difficult to place their output. The forward position remains in the hands of speculators, and they are finding increasing difficulty in coaxing buyers into business.

Nitrate of Soda.

This article is quiet; but local stocks being well held, spot prices are 11s. 1½d. per cwt. for 95 per cent., and 11s. 4½d. per cwt. for refined quality.

Tar Products.

LONDON, *June* 9.

The market generally is quiet, as is not unusual at this time of the year, and there is really very little business doing. In pitch, prices remain stationary; but so far as prompt delivery is concerned, makers are certainly rather anxious to sell, evidently with a view to clearing out stocks before the end of the season. The largest London producers still ask 31s. to 32s.; but dealers are open to sell at 27s. to 27s. 6d. according to position. As regards the east coast, a small business has again been done at prices varying from 26s. to 26s. 6d., but only for prompt delivery; and makers, as a rule, ask higher prices for forward. There is likely to be considerable uncertainty as to the future of this article until some of the large tar contracts are settled, which will doubtless be in the course of the next few weeks, as several may possibly come into the market during the present month. In South Wales there is no demand for prompt, and makers are evidently well supplied; but as regards forward, there is a strong demand for January-June next year. Distillers, however, decline to quote for this period just at present. So far as London is concerned, the demand in creosote is still very good, and, in fact, there is rather a scarcity for prompt. There has not, however, been much business doing, and prices may be taken as in about the same position as last week. In the Manchester and Liverpool district, there is no business of importance to report; and makers do not seem at all anxious to sell. Salts are decidedly better; and it is reported that several small parcels have been sold for shipment to America at fairly good prices. There is really nothing whatever doing in anthracene. Prices are purely nominal, and the position is likely to remain the same for some time to come. In solvent naphtha, the demand for home consumption is very good, especially for the qualities with a high flash-point; but for ordinary 90 per cent. at 160, there is certainly more offering, especially in the North of England. The position remains practically unchanged in benzol, and there is not very much business doing, except for gas-enriching purposes. Prices are fairly well maintained, and sales are again reported at 10¼d. London; but in the North lower prices have undoubtedly been accepted for home consumption. In carbolic acid, the position is certainly not so strong; and foreign consumers do not seem at all anxious to purchase for prompt, unless at a slight reduction on existing prices. The only business reported has been some small sales of 60's at 1s. 9½d.; and the foreign consumers are evidently not willing to improve on this price for forward delivery. In crystals, it is difficult to fix exact values,

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
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CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
Blackburn	1,250,000	Buffalo, N.Y.	2,000,000	Newcastle-on-Tyne	1,800,000
Windsor St. Works, Birmingham	2,000,000	Winnipeg, Man.	500,000	Leeds	1,800,000
Saltley Works, Birmingham	2,000,000	Colchester (Second Contract)	300,000	Malton	150,000
Colchester	300,000	York	750,000	Smethwick	500,000
Birkenhead	2,250,000	Rochester	500,000	Gravesend	300,000
Swindon (New Swindon Gas Co.)	120,000	Kingston, Ont.	300,000	Pernambuco, Brazil	125,000
Saltley, Birmingham (Second Contract)	2,000,000	Crystal Palace District	2,000,000	Duluth, (Second Contract)	300,000
Windsor St., Birmingham (Second Contract)	2,000,000	Duluth, Minn.	300,000	Leicester (Second Contract)	1,000,000
Halifax	1,000,000	Caterham	150,000	Newport (Second Contract)	250,000
Toronto	250,000	Leicester	2,000,000	Brockville	250,000
Ottawa	250,000	Enschede, Holland	150,000	Toronto (Third Contract)	750,000
Lindsay (Remodelled)	125,000	Buenos Ayres (River Plate Co.)	700,000	Montreal, Ont. (Second Con.)	1,800,000
Montreal	500,000	Burnley	1,500,000	Toronto (Fourth Contract)	1,000,000
Toronto (2nd Cont., Remodelled)	2,000,000	Kingston-on-Thames	1,750,000	Hamilton, Ont.	400,000
Belleville	250,000	Accrington	500,000	Rochester (Third Contract)	1,600,000
Ottawa (Second Contract)	250,000	Tonbridge	300,000	Leeds (Second Contract)	900,000
Brantford (Remodelled)	200,000	Stretford	500,000	Buenos Ayres (Primitiva Co.)	1,200,000
St. Catherines (Remodelled)	250,000	Oldbury	300,000	Buenos Ayres (New Co.)	1,200,000
Kingston, Pa.	125,000	Todmorden	500,000	Christchurch, N.Z.	300,000
Peterborough, Ont.	250,000	Saltley, Birmingham (Third Contract)	2,000,000	Rochdale	1,600,000
Wilkesbarre, Pa.	750,000	York (Second Contract)	750,000	St. John's, Newfoundland	250,000
St. Catherines (Second Cont.)	250,000	Rochester (Second Contract)	500,000	Brantford (Second Contract)	400,000
		Newport (Mon.)	250,000	Smethwick (Second Contract)	500,000
		Tokio, Japan	1,000,000	Pontypridd	250,000
				Montreal (Third Contract)	1,800,000

And, in addition, COAL GAS PLANTS at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

as it is generally believed that the German producers have accepted lower prices than have been reported on this market.

The average values during the week were: Tar, 15s. 6d. to 20s. Pitch, London, 27s. to 27s. 3d.; east coast, 26s. to 26s. 6d.; west coast, 25s. to 25s. 6d. Benzol, 90 per cent., 9¼d. to 9¾d.; 50-90 per cent., 10d. to 10½d. Toluol, 1s. 1d. to 1s. 1½d. Crude naphtha, 3⅝d. to 4d.; solvent naphtha, 1s. 0½d. to 1s. 1½d.; heavy naphtha, 11d. to 1s. Creosote, London, 1⅞d.; North, 1½d. to 1⅝d. Heavy oils, 2¼d. Carbolic acid, 60 per cent., 1s. 9½d. to 1s. 9⅝d. Naphthalene, £5 to £9; salts, 20s. to 22s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market has been exceedingly quiet during the past week. In London, the Gaslight and Coke Company still maintain their quotation at £12 5s.; but dealers are willing to sell other makes on Beckton terms at £12, while it is reported that in one instance £11 18s. 9d. was accepted. In Hull, there has been no business doing, and £11 18s. 9d. may be taken as about the ruling value. There is little of importance to report in Liverpool; but one or two small sales have taken place on a basis of £12 to £12 1s. 3d. In Leith, makers appear fairly firm in their ideas, and still refuse to quote anything under £12 5s. for forward delivery; but a prompt parcel has changed hands at £12 3s. 9d.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Whit week in Lancashire is becoming more and more a general holiday, and business in every department is at a standstill. Users of coal took care to be prepared for the holiday season, so that no inconvenience has been caused to the free course of trade. Except in house coal, the demand may be said to be steady, with no alteration in prices. As the summer advances, very little house coal or gas coal will be wanted, and a dull period for the coal market may be anticipated for some time to come.

Northern Coal Trade.

The coal trade of the north-east shows rather more activity, and there is a heavier shipment, which allows fuller working at the collieries. In the steam coal trade, best Northumbrian kinds are now quoted from 10s. 3d. to 10s. 6d. per ton f.o.b., second-class steams are from 9s. 9d. to 10s. 3d., and appear to be relatively sold forward more than "bests," and steam smalls are steady at about 6s. More coal, both steam and gas qualities, is now being sent to the Baltic ports; and this should continue for some months. As to gas coals, there is a slight increase in the demand for shipment; but the local consumption is now at its lowest ebb, so that the collieries that produce for land sale are only poorly off for trade. The contracts for the coal for the Newcastle and Gateshead Gas Company are now just about completed for the ensuing twelve months. The quantity is from 280,000 to 290,000 tons; and it has been settled at a substantial advance, though one that varies for different qualities of coal. The exact figures have not yet been officially declared, but probably 9d. per ton above the figures of last year—settled rather more than twelve months ago—may represent the medium improvement in values. In coke, the price is steady; and gas coke is quoted from 10s. 3d. per ton f.o.b.

Scotch Coal Trade.

Trade is not improving, but rather the reverse; prices, particularly for splint, being inclined to go down. This state of matters has enabled the Conciliation Board which sat in Glasgow this week to consider the request of the miners for an advance of 12½ per cent. upon their wages to refuse it, to the great disappointment of the men, who were in the belief that trade was better than it proved to be on investigation. The prices quoted are: Main 7s. 9d. to 8s. per ton f.o.b. Glasgow, ell 8s. 6d. to 10s., and splint 9s. 3d. to 9s. 6d. The shipments for the week amounted to 242,892 tons—a decrease of 6073 tons upon the preceding week, and of 370 tons upon the same week of last year. For the year to date, the total shipments have been 5,559,033 tons—an increase of 654,722 tons upon the corresponding period.

Water-Works Extensions at Bolton.—At an inquiry which was held into an application of the Bolton Corporation for sanction to borrow £4585 for water-works purposes, Mr. R. H. Swindlehurst, the Engineer, said the money was required for laying a high-pressure main, commencing at Dingle filter-beds, Belmont, and proceeding to Chorley Old Road. It was to afford a better supply to a developing district. The proposed main would run through a most valuable residential area. At the present time, they had a difficulty in affording a supply, particularly in the higher parts, on account of the pressure. They would also use the old main as long as they could; but it had been down for over thirty years.

Public Lighting at Plymouth.—Mr. E. G. Okell, the Electrical Engineer of the Plymouth Corporation, has charge of the public lighting of the town, and in his report, which has just been presented to the Town Council, there is a section devoted to this portion of his duties. From this it appears that there are now 2464 gas-lamps in the borough—an increase of 48 in the year. There has also been an extension of the electric arc lighting in the centre of the town. In regard to the gas-lamps, 67 new lanterns have been fixed, and 440 old ones repaired and refixed. The consumption of mantles has been at the rate of 5·85 per lamp per annum. The cost of public lighting is given at £6481 18s. 9d. for the past year, compared with £6100 16s. 3d. for 1904-5. The largest item is gas—£2137 6s. 8d., compared with £1961 9s. 6d. Wages of lamplighters came to £1883 17s. 11d., against £1776 8s. 4d.; the increase being explained by an addition to the number of men owing to the extensions in the lamps in scattered areas on the outskirts of the town. Electricity cost £1313 13s. 8d., against £1246 8s. 4d. The balance of the expenditure comprises establishment charges, cost of making and repairing lamps, examining fittings and burners, and other expenses of a similar character.

PARKINSON'S SLOT COOKERS.

NEW DESIGNS.

Particulars on Application.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),
COTTAGE LANE, CITY ROAD, LONDON.
BELL BARN ROAD, BIRMINGHAM.

Gas-Engines for Pumping Sewage.

In the "JOURNAL" for the 17th of April (p. 188), we reported a discussion which took place in the London County Council on a report by the Main Drainage Committee in regard to certain tenders which had been submitted for the supply and fixing of gas-engines at the new pumping-station to be erected in Bermondsey in connection with flood relief works. Four offers were sent in; but the firms did not tender to a detailed specification, but each submitted a quotation for engines of their own make which appeared most suitable for the work. Upon examination of the drawings accompanying the tenders, it was found that modifications were necessary; and as a result of these alterations, one of the firms—the British Westinghouse Company—found that they were able to reduce the amount of their tender by £1000. In the circumstances, the Committee were of opinion that the Council would be well advised to accept the Company's offer to supply and fix the engines for the sum of £9987; and they recommended accordingly. The Council, however, after approving the estimate of the Finance Committee, referred back for further consideration the recommendation as to the acceptance of the tender. The Committee therefore invited fresh tenders, which were duly sent in, as follows: The Campbell Gas-Engine Company, Limited, £9460; Messrs. Fielding and Platt, Limited, £9470; the British Westinghouse Company, Limited, £9987. The Committee considered that the tender submitted by the first-named Company, which was lower by £240 than their previous offer, should be accepted; and at the last meeting of the Council they recommended—"That expenditure not exceeding £9460 be sanctioned for the manufacture, supply, delivery, and erection of three gas-engines at the new pumping-station in Bermondsey; and that the tender, amounting to £9460, of the Campbell Gas-Engine Company, Limited, in respect of the work referred to, be accepted." The recommendation was agreed to.

New Joint-Stock Company.—The Devon Gas Association has been registered, with a capital of £6000 in £10 shares, to take over the Gas Companies at Chagford, Chudleigh, and Moretonhampstead, Devon, carried on by Mrs. Emilie Louise Willey and Mr. W. Cash, the Executors of the late Mr. H. A. Willey. There will be no initial public issue.

Improved Church Lighting.—Referring to the opening of a new Baptist Church at Ebbw Vale (Mon.), the "Merthyr Express" calls special attention to the excellent lighting arrangements carried out by the local Gas Company. The body of the church and gallery are lit by five 700-candle power Lucas lamps; the porch by one 400-candle power Lucas lamp. Under the gallery there are eight two-light and one three-light inverted incandescent lamps; and the basement has eight two-light pendants, with shades—a scheme as suggested by Mr. W. V. Watson, the Gas Manager, and one "making a most beautiful illumination."

Reservoir Burst at Houghton-le-Spring.—Some 2 million gallons of water have been lost by the bursting of a reservoir near Houghton-le-Spring, belonging to the Sunderland and South Shields Water Company. It was noticed that the level of the water had gone down without reasonable cause; and all the outlet-valves were shut down. The water, however, continued to get lower; and eventually it rushed out of the embankment surrounding the reservoir across a field, and flooded the Sunderland turnpike. Ultimately the whole of the contents of the reservoir escaped, and an examination showed that a portion of the bottom had sunk.

Malta and Mediterranean Gas Company, Limited.—In the report which they will submit to the annual meeting of the Company on the 19th inst., the Directors state that the accounts for the year ended March 31 show a very satisfactory increase in the gas-rental, and also in the sales of residual products. The balance of the general revenue account is £5677. They recommend the payment of the usual dividends on the first and second preference capital, and a distribution of 3 per cent. on the ordinary capital, making, with the interim dividend paid in December last, 5 per cent. for the year, free of income-tax. This will leave a balance of £1587 to be carried forward.

The Cost of the Torpoint Water Bill.—Considerable discussion continues to be carried on at Torpoint with reference to the payment of the costs of promoting the Water Bill which was rejected in Parliament last year. The total amounted to about £5754. After considerable negotiation, the Admiralty agreed to pay £5000; the Bill having been promoted at their instance, though, owing to a change of policy, they did not support it in Parliament. At a meeting of the Torpoint District Council on Thursday last, it was decided that the Solicitors to the Council should distribute the £5000 among the persons to whom the costs are owing, and that the balance due to Mr. Diggle, the Engineer of the scheme, be left for the present, and 3½ per cent. interest paid upon it. Mr. Diggle had offered to agree to these conditions; and the Local Government Board will be asked to confirm the arrangement, or to sanction some other way of spreading the payment of the amount over five years.

Todmorden Corporation Gas Undertaking.—In the "JOURNAL" last week (p. 662), we published a few figures in regard to the working of the gas undertaking of the Todmorden Corporation in the year ending March 31 last, and announced a reduction in the price of gas to take effect as from the 1st prox. We are now in a position to give a few additional particulars, from the report presented to the Gas Committee by the Engineer and Manager (Mr. Henry Talbot) and the accounts accompanying it. There was an increase of 240 cubic feet of gas made per ton of coal carbonized, and of 8,497,025 cubic feet in the quantity sold last year, as compared with the year 1904-5. The net profit was £2769, against £2801—a difference of £32. This is accounted for by the fact that a reduction of 3d. per 1000 cubic feet took place on the 1st of July last, and consequently was in operation for three-quarters of the financial year. This represented £1100. The reduction now decided upon is from 2s. 11d. to 2s. 8d., less 12½ per cent.; and the prepayment consumers are to have forthwith 30 cubic feet of gas for 1d., instead of 25 cubic feet. After consideration of the report, it was unanimously decided to advance Mr. Talbot's salary by £50 per annum.

The "MAIN"

Gas

Cooker

RELIABLE AND UP-TO-DATE.

PROMPT DELIVERY.

See our NEW and Complete Catalogue of Gas Apparatus.

COPIES ON APPLICATION.

R. & A. MAIN, LIMITED,

LONDON, GLASGOW, FALKIRK, BRISTOL, MANCHESTER,

BIRMINGHAM, AND BELFAST.

The Commissioners let the contract for the supply of prepayment meters—2-light—for the year, to Messrs. Alder and Mackay, of Edinburgh.

The Kidderminster Gas Company have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for new foul mains, and also for one of Everitt's patent tar-extractors.

Mr. Charles R. Adamson has been appointed by Messrs. John Wright and Co. as their managing representative for the Midlands, South Wales, and the South-West of England—making his headquarters at Bristol.

During the last five weeks, a series of exhibitions of gas cooking, heating, lighting, and power appliances, has been held in various parts of the British Gaslight Company's district at Hull. The lectures were given by Miss Edith Sanderson (Double First-Class *Diplomée*, National Training School of Cookery); and during the period upwards of 700 orders for gas-cookers were obtained.

In accordance with the announcement which recently appeared in our advertisement pages, Messrs. George Nichols, Howes, Young, Alder, and Co. will offer for sale at Bristol, next Thursday, £30,000 of general capital stock and £10,000 of new debenture stock of the Bristol Gas Company. The former stock is entitled to a maximum dividend of 5 per cent., and the interest on the latter is 4 per cent. per annum. The stocks will be sold in lots of £100 each or less.

An exhibition of gas appliances by Messrs. R. & A. Main, Limited, has been held in the Public Hall at East Kilbride, with Miss Lizzie L. Waldie as lecturer. The East Kilbride Gas Company are to fix Main cookers free, and let them on hire at a moderate rate. A ten days' exhibition of the gas appliances of the Carron Company was opened in the Queen's Gate Hall, Inverness, last week. Being under the auspices of the Corporation Gas Department, it was opened by Provost Ross, and at the inaugural ceremony addresses were also delivered by Mr. H. Carr Roberts, of the Carron Company, and Mr. D. Macpherson, the Convener of the Gas Committee. Miss Dods was the lecturer.

The sixty-second annual dinner and sports of Messrs. Glover and Main, Limited, were held on Saturday, the 2nd inst., at Great Yarmouth. After the sports had taken place in the Corporation Recreation Grounds, the party assembled for dinner at the Royal Aquarium, where covers were laid for 600. The chair was occupied by Mr. R. T. Glover, the Chairman of the Company. After the various toasts had been proposed and responded to, the prizes were distributed. Subsequently, Mr. Glover Clark and Mr. Welsh, on behalf of the staff and employees of the firm, made a presentation of a cabinet and tea service to Mr. Thomas Glover, a Director of the Company and the Works Manager, on his approaching marriage. In thanking those present for their great kindness, Mr. Glover said that he and his future wife would ever prize the gifts, coming as they did from those with whom he was so closely associated. The party returned to town in the evening, after having spent a most enjoyable day.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

WORKS FOREMAN. Kirkcaldy Gaslight Company.
DRAUGHTSMAN. No. 4612.

Gas Manufacture Correspondence Classes.

SECRETARY. Cambridge.

Mantle Factory or Plant for Sale. No. 4611.

Patents for Disposal.

GAS PLANT, &c. No. 1614.
INVERTED BURNER. "Patentee," Highbury New Park.

Plant, &c., for Sale.

CONDENSERS, MOUTHPIECES, COLUMNS, GASHOLDER, &c. Hull Gas-Works.
ENGINE BOILERS, MOUTHPIECES, &c. Enfield Gas Company.
STREET LANTERNS. No. 4613.

Stocks and Shares.

BARNET GAS AND WATER CO. June 26.
ELSTREE, &c., GAS CO. June 26.
NORTHFLEET, &c., GAS CO. June 26.
SLOUGH GAS COMPANY. June 28.
SOUTH SUBURBAN GAS COMPANY. June 26.
WOKING WATER AND GAS CO. June 26.

TENDERS FOR

Benzol.

WARRINGTON CORPORATION. Tenders by June 21.

Coal and Cannel.

BEVERLEY GAS DEPARTMENT. Tenders by June 27.
BOLTON GAS DEPARTMENT. Tenders by June 29.
CLONMEL GAS DEPARTMENT. Tenders by June 26.
COLWYN BAY AND COLWYN GAS DEPARTMENT. Tenders by June 27.
FILEY GAS DEPARTMENT. Tenders by June 25.
HONLEY GAS DEPARTMENT. Tenders by June 20.
KESWICK GAS COMPANY. Tenders by June 20.
NEW MILLS GAS DEPARTMENT. Tenders by June 25.
NEWRY GAS DEPARTMENT. Tenders by June 29.
RHONDDA GAS AND WATER DEPARTMENT. Tenders by June 15.
RHYL GAS DEPARTMENT. Tenders by June 27.
SAFFRON WALDEN CORPORATION. Tenders by June 25.
SAFFRON WALDEN UNION. Tenders by June 18.
SOWERBY BRIDGE GAS DEPARTMENT. Tenders by June 25.
TEIGNMOUTH GAS DEPARTMENT. Tenders by July 2.
TORQUAY GAS COMPANY. Tenders by June 18.
WARRINGTON CORPORATION. Tenders by June 21.

Coke.

SAFFRON WALDEN UNION. Tenders by June 18.

Condensers, &c.

LYMM GAS DEPARTMENT. Tenders by June 20.

Cookers.

WARRINGTON CORPORATION. Tenders by June 21.

Fire-Clay Goods.

WARRINGTON CORPORATIO . Tenders by June 21.

Gasholder.

RIPON GAS DEPARTMENT. Tenders by June 19.

General Stores, Oils, Paints, Cement, Red and White Lead, Lead Pipes, &c., &c.

WARRINGTON CORPORATION. Tenders by June 21.

Iron and Steel.

WARRINGTON CORPORATION. Tenders by June 21.

Lamps.

WARRINGTON CORPORATION. Tenders by June 21.

Meters.

WARRINGTON CORPORATION. Tenders by June 21.

Oxide (New and Spent).

EXETER GAS COMPANY.

Pipes, &c.

CHORLEY GAS DEPARTMENT. Tenders by June 20.
RHONDDA GAS AND WATER DEPARTMENT. Tenders by June 15.
WARRINGTON CORPORATION. Tenders by June 21.

Tar and Liquor, &c.

CHORLEY GAS DEPARTMENT. Tenders by June 19.
BRIDGEWATER COLLIERIES COKE WORKS. Tenders by June 25.
KESWICK GAS COMPANY. Tenders by June 20.
LOUGHBOROUGH GAS DEPARTMENT. Tenders by June 23.
LONGTON GAS DEPARTMENT. Tenders by June 25.
NEW MILLS GAS DEPARTMENT. Tenders by June 25.
READING GAS COMPANY. Tenders by June 25.
ROCHESTER, CHATHAM, AND STROOD GAS COMPANY. Tenders by June 20.

Valves, Taps, Brass and Copper Tubing, Fittings, &c.

WARRINGTON CORPORATION. Tenders by June 21.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 696.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	21—22	..	4 15 5
160,000	10	,,	7½	Do. 7 p.c.	14½—15½	..	4 16 9
200,000	5	May 11	7	Bombay, Ltd.. . . .	6¾—7	..	5 0 0
40,000	5	,,	7	Do. New, £4 paid	4¾—5¼	..	5 6 8
50,000	10	Mch. 9	14	Bourne-) 10 p.c. . .	28½—29½	..	4 14 11
51,810	10	,,	7	mouth Gas) B 7 p.c. .	16½—17½	..	4 0 0
53,200	10	,,	6	and Water) Pref. 6 p.c.	15—16	..	3 15 0
380,000	Stk.	Feb. 22	12½	Brentford Consolidated	263—268	..	4 13 3
300,000	,,	,,	9½	Do. New . . .	200—205	..	4 12 8
50,000	,,	,,	5	Do. 5 p.c. Pref. .	123—128	..	3 16 11
206,250	,,	Dec. 14	4	Do. 4 p.c. Deb. .	105—108	..	3 14 1
220,000	Stk.	Mch. 9	11½	Brighton & Hove Orig.	230—235	..	4 15 9
246,320	,,	,,	8½	Do. A. Ord. Stk. .	165—170	..	4 17 1
460,000	20	Apl. 11	10	British	42—43	..	4 13 0
100,000	Stk.	Feb. 22	6	Bromley, Ord. 5 p.c. .	121—124	..	4 16 9
165,700	,,	,,	4½	Do. do. 3½ p.c. .	92—95	..	4 14 9
500,000	10	May 11	7	Buenos Ayres (New) Ltd.	12—12½	..	5 12 0
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb. .	97—99	..	4 0 10
150,000	20	Mch. 9	8½	Cagliari, Ltd.	23—25	..	6 12 0
100,000	10	Sept. 28	10	Cape Town & Dis., Ltd.	16—17	..	5 17 8
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.. .	9¾—10¼	..	4 7 10
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	100—102	..	4 8 3
1,443,280	Stk.	Feb. 22	5⅛	Commercial 4 p.c Stk. .	113—115	..	4 10 5
560,000	,,	,,	5	Do. 3½ p.c. do. .	110—112	..	4 9 3
475,000	,,	Dec. 14	3	Do. 3 p.c. Deb. Stk.	85—87	..	3 9 0
800,000	Stk.	,,	6⅔	Continental Union, Ltd.	128—131	..	4 19 3
200,000	,,	,,	7	Do. 7 p.c Pref.	143—148	..	4 14 7
432,070	Stk.	Feb.	5⅔	Derby Con. Stk. . . .	122—124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk. . . .	105—107	..	3 14 9
486,090	10	Jan. 25	11	European, Ltd.	24—25	..	4 8 0
354,060	10	,,	11	Do. £7 10s. paid	18—19	..	4 6 10
15,223,235	Stk.	Feb. 8	4⅝	Gas-) 4 p.c. Ord. . .	97—98	—½	4 9 9
2,600,000	,,	,,	3¾	light) 3½ p.c. max. .	87—89	..	3 18 8
3,799,735	,,	,,	4	and) 4 p.c. Con. Pref.	108—111	+1	3 12 1
4,193,975	,,	Dec. 14	3	Coke) 3 p.c. Con. Deb.	86—88	..	3 8 2
258,740	Stk.	Mch. 9	5	Hastings & St. L. 3½ p.c.	100—105	..	4 15 3
82,500	,,	,,	6½	Do. do. 5 p.c.	121—124	..	5 4 10
70,000	10	Apl. 11	11	Hongkong & China, Ltd.	19½—20½	..	5 7 4
4,940,000	Stk.	May 11	8	Imperial Continental .	177—179	..	4 9 5
473,600	Stk.	Feb. 8	3½	Do. 3½ p.c. Deb. Red.	96—98	..	3 11 5
175,242	Stk.	Mch. 28	6	Lea Bridge Ord. 5 p.c. .	121—126	..	4 15 3
561,000	Stk.	Feb. 22	10	Liverpool United A . .	235—237	..	4 4 5
718,100	Stk.	Feb. 22	7	Liverpool United B .	169—171	..	4 1 10
306,083	,,	Dec. 29	4	L'rpool Unit'd Deb. Stk.	109—111	..	3 12 1
75,000	5	Dec. 14	5	Malta & Medn., Ltd. .	4¼—4¾	..	5 5 3
560,000	100	Apl. 2	5	Met. of) 5 p.c. Deb..	102—104	..	4 16 2
250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	May 31	3½	Monte Video, Ltd. . .	11—12*	..	5 16 8
1,675,892	Stk.	Feb. 22	4½	Newc'tle & G'tesh'd Con.	109—111	—1	4 3 4
406,025	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	99—101	..	3 9 4
15,000	10	Mch. 9	10	North Middlesex 10 p.c.	19½—20½	..	4 17 7
52,940	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	May 11	8	Oriental, Ltd. . . .	147—150	..	5 6 8
600,000	5	Mch. 28	7	Ottoman, Ltd. 10 . .	6—6½	..	5 7 8
398,490	5	Apl. 26	7	Primitiva Ord. . . .	6½—7	..	5 0 0
796,980	5	Jan. 25	5	Do. 5 p.c. Pref. .	5⅝—5⅞	..	4 13 0
488,900	100	June 1	4	Do. 4 p.c. Deb. .	96—98*	..	4 1 8
851,070	10	Apl. 26	7	River Plate Ord. . . .	12½—13	..	5 7 8
300,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb. .	98—100	..	4 0 0
250,000	10	Mch. 28	8	San Paulo, Ltd. . . .	13¾—14¼	..	5 12 3
70,000	50	Jan. 2	5	Do. 5 p.c. Deb. .	50—52	..	4 16 2
135,000	Stk.	Mch. 28	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	243—245	..	4 1 8
523,498	,,	,,	10	Do. C	243—245	..	4 1 8
126,106	Stk.	Mch. 9	5½	Shrewsbury Ord. 5 p.c.	109—119	..	4 12 5
70,000	10	May 31	10	South African	15—16⅞	..	6 5 0
6,250,000	Stk.	Feb. 22	5½	South Met., 4 p.c. Ord.	127—129	..	4 5 3
1,895,445	,,	Jan. 11	3	Do. 3 p.c. Deb.	87—89	..	3 7 5
575,000	Stk.	Mch. 9	5½	S'th Suburb'n Ord. 5 p.c.	120—123	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref. .	125—130	..	3 16 11
112,533	,,	Jan. 11	5	Do. 5 p.c. Deb. Stk.	132—137	..	3 13 0
502,310	Stk.	May 11	5	Southampton Ord. . . .	107—112	+2	4 9 3
120,000	Stk.	Mch. 9	6¼	Tottenham) A 5 p.c. .	124—127	..	4 18 5
363,020	,,	,,	4¾	and) B 3½ p.c. .	99—102	..	4 13 2
137,500	,,	Dec. 14	4	Edmonton) 4 p.c. Deb.	105—107	..	3 14 9
182,380	10	Dec. 29	8	Tuscan, Ltd.	10¼—10⅝	..	7 8 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
30,000	Stk.	Feb. 22	5⅔	Wands-) A 5 p.c. . .	—	..	—
255,636	,,	,,	6¼	worth) B 3½ p.c. . .	133—136	..	4 11 11
75,000	,,	,,	5 17/20	and) C 3½ p.c. . .	110—113	..	4 16 0
69,416	,,	Dec. 29	3	Putney) 3 p.c. Deb. Stk.	83—86	..	3 9 9
745,872	,,	Mch. 9	5⅛	West Ham 5 p.c. Ord. .	107—109	..	4 14 0
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	122—125	..	4 0 0
193,300	,,	Dec. 29	4	Do. 4 p.c. Deb. Stk.	106—109	..	3 13 5

Prices marked * are "Ex div."

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism London."

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

GAZINE—A radical Solvent and Preventative of Naphthalene deposits, which has been used for many years on the Continent for the cleaning of Mains and Services, and is now being adopted in England. It is also used for the Enrichment of Gas, and has an Illuminating Value of double that of 90 per cent. Benzol.
Supplied by C. BOURNE, West Moor Chemical Works, Killingworth, near NEWCASTLE-ON-TYNE.

GASHOLDER PAINTING.
PAINTING Work for all kinds of Gas-Works Plant, Roofs, Bridges, &c., undertaken by Contract or otherwise.
FREDERICK BOYALL, 31, Regent's Row, DALSTON, N.E.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

GAS OILS.
MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 8, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

TEMPERLEY TRANSPORTERS
FOR Rapid and Economical Handling of Coal and Coke in Gas-Works.
Next Illustrated Advertisement will appear on June 26.
TEMPERLEY TRANSPORTER COMPANY,
72, BISHOPSGATE STREET WITHIN, LONDON, E.C.
Telephone: 365 LONDON WALL. Telegrams: "TRANSUMO."

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

TAR AND LIQUOR WANTED.
Best Prices paid.
DENT AND CO.,
Ouse Chemical Works, SELBY.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

GAS MANUFACTURE.
CORRESPONDENCE Classes now starting in this subject. Fees low.
Apply SECRETARY, 26, Green Street, CAMBRIDGE.

APPLICANTS for the position of ASSISTANT-ENGINEER to the Whitehaven United Gas Company, Limited, are THANKED, and informed that the APPOINTMENT HAS BEEN MADE.

WANTED a Competent Draughtsman for Gasholder and General Gas Plant Work.
State Experience fully, Age, and Salary required to No. 4612, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKS FOREMAN.
WANTED, by the Kirkcaldy Gaslight Company, Limited, a WORKS FOREMAN. Must have had control of Workmen, and considerable Carbonizing Experience, and be under 40 Years of age. Wages £2 10s. per week, without House, Coal, &c.
Apply at once, stating Experience and enclosing Testimonials, to JAMES KINCAID, Manager.

WANTED, Copper Scrap, 72s.; Brass, 48s.; Zinc, 16s.; Lead Ashes, 8s. Also old Wet Gas-Meters bought.
ROSSE WORKS, Leeds Road, BRADFORD.

GAS PLANT AND FITTINGS.
THE following Plant and Fittings, replaced by extension of Works, are FOR SALE on the Gas-Works, St. Mark Street, Groves, Hull—viz.:
One Set ANNULAR ATMOSPHERICAL CONDENSERS (4 Tubes). Height, 30 feet; diameter, Outer Tube, 42 inches, and of Inner Tube 33 inches. Diagonals, 12 inch diameter. Inlet and Outlets, 16 inches diameter. Complete with Rack and Pinion and Bye-Pass Valves.
36 SELF-SEALING MOUTHPIECES, Oval, 21 in. by 15 in. with Centre and Right-Hand Sockets.
60 SELF-SEALING MOUTHPIECES, "D" Oval, 24 in. by 15 in. with Right-Hand and Left-Hand Sockets.
Eight CAST-IRON COLUMNS, with One Tier of Lattice Girders. Also 78 feet diameter Two-Lift GASHOLDER. Height of Columns, about 38 ft., diameter at base, 1 ft. 10 in.
Further Details may be obtained on application, or the Plant may be viewed on the Works by appointment.
Tenders (to include Dismantling and all costs of Removal, Conveyance, &c., from the Company's Works) to be addressed to the Secretary, Gas Offices, St. Mark Street, Hull, endorsed "Tender for Disused Plant," not later than noon on Wednesday the 27th curt.
JOHN HOLLIDAY,
Engineer.
June 1, 1906.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, & MESSEL, LTD.
(with which is amalgamated WM. PEARCE & SONS, LTD.),
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone 341, AVENUE.

FOR SALE, cheap, about 200 14-inch Copper STREET LANTERNS, in good order.
Apply No. 4613, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, Cheap—24-inch Specials, Bends, Tees, Elbows, and 24-inch Valves. All in good condition. Makers, Newton, Chambers, & Co.
Apply T. DUXBURY AND CO., MANCHESTER.

INCANDESCENT Mantle Factory for SALE. Low Rental. Or Plant, consisting of Gas-Engine (National, nearly new), Pump, Holder, Compressor, with all the usual Fittings, would be sold separately. Any reasonable Offer entertained.
Address No. 4611, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PURIFIERS for Sale. Splendid set of Four 10-feet square Boxes, planed joints, new Covers. Re-erected cheap for immediate sale.
Also sets of 12-feet, 16-feet, 20-feet, and 30-feet square PURIFIERS, erected Complete and Perfect.
FIRTH BLAKELEY, Thornhill, DEWSBURY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE—Valuable Patents of New INVERTED INCANDESCENT GAS-BURNER. Will entirely revolutionize present method of Inverted Lighting; being for practical lighting, not merely ornamental purposes. A full-sized Mantle being used, a vast volume of light at Minimum Cost is obtained, and Back-Lighting being prevented. This is a valuable Invention. Price £2000, or part Purchase and Royalty. Can be seen by *bonâ-fide* intending Purchasers by appointment.
Address PATENTEE, "Fairlight," 121, HIGHBURY NEW PARK, N.

DISUSED PLANT FOR SALE.
OFFERS are invited for the following, which may be seen at the Enfield Gas Company's Works, Ponders End Station, G.E.R.—viz.:
One 6-Horse Power WINDING ENGINE, Friction Clutch, and Reverse Action.
Two 8-Horse Power CORNISH STEAM-BOILERS.
Sixty RETORT MOUTHPIECES, 14 in. by 20 in. O, with Morton Lids.
Eighteen RETORT MOUTHPIECES, 15 in. by 21 in. Oval, with luted Lids.
Address, C. W. OFFORD, General Manager, Enfield Gas Company, Sydney Road, ENFIELD.

PATENTS.
FOR disposal, valuable British and FOREIGN PATENTS relative to various parts of Gas-Works. The above subjects are worthy the best attentions of the most up-to-date and progressive firms, as they are a considerable advance on present day methods, and cover an exceedingly wide field of application. Some are easily applicable to present plant, and also promise to revolutionize with great advantage present Systems.
Open to make terms with sound established firms, or to the formation of a Limited Company, as the combined subjects are ample to ensure good returns if properly handled.
For Particulars, address No. 4614, care of Mr. King 11, Bolt Court, FLEET STREET, E.C.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works Elland.

THE Directors of the Keswick Gas Company invite TENDERS for the supply of 1800 Tons of best screened GAS COAL or NUTS, to be delivered at Keswick Railway Station between the 1st day of July, 1906, and the 30th of June, 1907, in such quantities and at such times as may be required.

Tenders, stating price per ton, endorsed "Tenders for Coal," to be sent to the undersigned not later than the 20th inst.

The Directors do not bind themselves to accept the lowest or any Tender.

No Form of Tender supplied.

J. H. Brodie,
Secretary.

Main Street, Keswick,
June 12, 1906.

THE Directors of the Keswick Gas Company invite TENDERS for their surplus TAR and AMMONIACAL LIQUOR for Twelve Months from the 30th inst., at per ton delivered into Contractors' Tanks at Keswick Railway Station.

Sealed Tenders, endorsed "Tenders for Tar or Liquor," will be received by the undersigned on or before Wednesday, the 20th inst.; but the Directors do not bind themselves to accept the highest or any Tender.

Forms of Tender are not supplied.

J. H. Brodie,
Secretary.

Main Street, Keswick,
June 12, 1906.

HONLEY URBAN DISTRICT COUNCIL.
(Gas Department.)

THE Gas Committee of the above Council invite TENDERS for the supply of about 2000 Tons of GAS COAL (Slack) and CANNEL, to be delivered free at L. & Y. Rly. Station, Honley, between the 1st of July, 1906, and the 30th of June, 1907, in such quantities, and at such times, as may be required.

Sealed Tenders, endorsed "Tender for Gas Coal," giving full Particulars of the Coal offered, to be addressed to the Chairman of the Gas Committee, at the Gas-Works, Honley, not later than the 20th of June, 1906.

No Special Form of Tender issued.

The Committee do not bind themselves to accept the lowest or any Tender; and they reserve the right to divide the quantity.

Harry Marsden,
Manager.

Gas-Works, Honley,
Near Huddersfield,
June 1, 1906.

SOWERBY BRIDGE URBAN DISTRICT COUNCIL.
(Gas Department.)

TENDERS FOR CANNEL AND COAL.

THE Gas Committee are prepared to receive TENDERS for the supply and delivery of 14,000 Tons of best Screened GAS COALS and 1200 Tons of best CANNEL COALS, or such quantities as may be required for the Gas-Works at Sowerby Bridge and Luddenden Foot during the period of Twelve Months between the 1st day of July, 1906, and the 30th day of June, 1907.

Tenders will be received for the whole or any portion of the above quantity.

Specifications, Forms of Tender, and all Information can be obtained on application to the Engineer, Mr. A. W. Bissell, Gas-Works, Sowerby Bridge.

The Gas Committee reserve the right to accept Tenders for the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, to be delivered not later than Monday morning, June 25, 1906, and endorsed "Tender for Coal" or "Cannel," to

R. W. Evans,
Solicitor and Clerk to the Council.

Commercial Bank Chambers,
Halifax.

URBAN DISTRICT COUNCIL, BOROUGH OF NEWRY.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Council invite TENDERS for the supply of 4000 Tons of best screened GAS COAL (with quotation for unscreened Gas Coal at same time) for a period of Twelve Months, to be delivered in such quantities and at such times as may be required by the Committee, and to weigh 20 cwt. to the Ton over the Gas Committee's Weighbridge at their Works (said Machine is regularly inspected by Officer under Weights and Measures Act), and delivered *free ex* Ship or Steamer at Albert Basin, Newry.

The Coal to be Fresh Wrought, Dry, and Free from Hards, Smudge, Dirt, Shale, Pyrites, or other objectionable matter for Gas making.

Further Particulars may be obtained from Mr. B. Gibson, Manager.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the coal, and where raised, to be addressed to T. P. Ledlie, Esq., Chairman, and delivered to the undersigned not later than 10.30 a.m. on Friday, the 29th of June.

The Committee reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender. They also reserve the power to decline acceptance of any Coal not equal in their belief to that contracted for.

Robert H. Doherty,
Clerk,
Urban District Council of Newry.

New Town Hall, Newry,
June 8, 1906.

THE

Institution OF Gas Engineers.

THE

ANNUAL GENERAL MEETING

WILL BE HELD ON

TUESDAY (10.30 a.m.), WEDNESDAY (10 a.m.), and THURSDAY (10 a.m.)

June 19th, 20th, and 21st,

AT THE

INSTITUTION OF MECHANICAL ENGINEERS,

STOREY'S GATE, ST. JAMES'S PARK, WESTMINSTER, S.W.,

By kind permission of the Council of that Institution.

The Chair will be taken by the President,

CHARLES WOOD, Esq., F.C.S.

In connection with the Meeting, an Excursion to Boulogne has been arranged for Friday, 22nd June. Full Particulars are announced in the Programme.

THE BENEVOLENT FUND.

The Annual General Meeting of the Contributors to the Benevolent Fund will be held on Wednesday, 20th June, at 10 a.m.

WALTER T. DUNN, Secretary.

39, Victoria Street, Westminster.

TO COAL MERCHANTS, SHIPOWNERS, AND OTHERS.

THE Directors of the Torquay Gas Company are prepared to receive TENDERS for the supply of about 16,000 Tons (or such other quantity as may be agreed on) of the best approved GAS COALS.

Tenders to state the Price of the Coals, and the Freight to Dartmouth or Torquay, separately and together, and also for delivery into the Company's Works, adjoining the Great Western Railway, free of all charges.

Further Particulars and Forms of Tender may be obtained from Mr. Beynon, the Manager of the Company, Hollacombe, Paignton, and Tenders are to be sent to the undersigned before the 18th day of June inst.

R. P. Kitson,
Secretary.

Torquay, June 7, 1906.

BOROUGH OF BEVERLEY.

TENDERS FOR COAL.

THE Gas Committee are desirous to receive TENDERS for the supply of not exceeding 7000 Tons of COAL, for use at the Gas-Works, Beverley, for a period of One Year, from the 30th of September next, to be delivered as from time to time directed, and at the expense of the Contractors, f.o.b. at Keadby or at the pits, or at the Railway Station, Beverley, according to terms of Contract.

The Coal to be of the best kind, well screened, free from Sulphur, Bats, Bind, Refuse, and Dirt, and to be weighed, 21 cwt. to the ton, upon the Corporation machine.

Payments will be made from time to time so long as the Contractors shall duly fulfil the Contract.

The Corporation do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide the Contract as they think fit.

Further Information and Forms of Tender may be obtained of the Gas Manager, Mr. F. W. Oldfield, at the Gas-Works, Beverley, and Tenders, endorsed "Tender for Coals," must be delivered at my Office not later than Ten a.m. on Wednesday, the 27th day of June, 1906.

J. Willis Mills,
Town Clerk.

FILEY URBAN DISTRICT COUNCIL.

TENDERS FOR COAL.

THE Council invite Tenders for the supply of 1300 to 1500 Tons of GAS COAL in the Twelve Months ending the 30th of June 1907.

Delivery to be made at the N.E. Railway Company's Depôt, Filey.

The Coal must be of good quality, suitable for Gas-making, and free from Bats, Pyrites, and other Refuse.

The Tender may be for Screened, Unscreened Coal, or Nuts.

Payments will be made Monthly.

The following are the approximate monthly quantities required:—

1906.		1907.	
July -	100 Tons.	January -	140 Tons.
August -	170 ,,	February -	110 ,,
September -	150 ,,	March -	100 ,,
October -	120 ,,	April -	80 ,,
November -	140 ,,	May -	70 ,,
December -	150 ,,	June -	70 ,,
	830		570

Tenders to be addressed to the Chairman, Urban Council, Filey, and to be sent in on or before the 25th of June, 1906.

Henry Tobey,
Engineer.

Malton.

CORPORATION OF CLONMEL.
(Gas Department.)

TENDERS FOR COAL.

THE Gas Committee of the above-named Corporation are prepared to receive and consider TENDERS for the supply of 3000 Tons of good Durham or Lancashire GAS COAL. Delivery in Waterford, to extend over the period from the acceptance of the Tender to the 30th of June, 1907, and to be in such quantities as shall be required from time to time.

Tenders to state prices both by Steamer and Sailer, and to be addressed to Thomas P. Morrissey, Esq., Alderman, J.P., Chairman of the Committee, Gas Offices, Clonmel, by the 26th of June, 1906.

No Forms of Tender are issued.

Further Information will be supplied by the Secretary.

TEIGNMOUTH URBAN DISTRICT COUNCIL.

THE Gas Committee of the above Council invite TENDERS for the supply of 3400 Tons of best Durham or other good GAS COAL, screened or unscreened. Same to be supplied to the requirements of the Council between the 31st day of July, 1906, and the 30th day of June, 1907. The Coal must be fresh-wrought, and free from all impurities.

No special Tender Form will be issued.

Tenders must be accompanied by a full description and practical working Analysis of the Coals quoted, and may be f.o.b., c.i.f., Teignmouth Harbour, or f.o.r. Teignmouth Railway Station.

Sealed Tenders, endorsed "Gas Coals," to be sent to the undersigned not later than Monday, the 2nd day of July, 1906.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
J. Alex. Gray,
Gas Manager.

Gas-Works,
Teignmouth,
June 9, 1906.

RHONDDA URBAN DISTRICT COUNCIL.
(Gas and Water Department.)

TENDERS FOR GAS COALS AND PIPES.

THIS Council are prepared to receive TENDERS for the following—

1—The supply from the 1st of July, 1906, to the 30th of June, 1907, of about 15,000 Tons of GAS COALS delivered at Porth and Ystrad Gas-Works.

2—For the supply and delivery of CAST-IRON PIPES required from the 1st of July, 1906, to the 30th of June, 1907.

Specifications and Forms of Tender can be obtained on application to the Engineer and Manager, Mr. Octavius Thomas, Gas and Water Offices, Pentre, Glam.

Tenders to be addressed to the Chairman of the Gas and Water Committee, endorsed "Tender for Coal" or "Tender for Cast-Iron Pipes," as the case may be, and delivered at my Office not later than Ten a.m. on Friday, the 15th of June, 1906.

The Contractors will be required to pay the Standard Rate of Wages recognized in the District.

The Council do not bind themselves to accept the lowest or any Tender.

Walter P. Nicholas,
Clerk to the Council.

Council Offices, Pentre,
Glam., June 4, 1906.

READING GAS COMPANY.

TENDERS FOR TAR.

THE Directors of the Reading Gas Com- pany invite TENDERS for the purchase of their surplus Coal-Gas and Carburetted Water-Gas TAR for One Year, commencing on the 1st of July next.

Specifications for the Contract will be forwarded on application to the Engineer and Manager, Mr. Douglas H. Helps, Assoc.M.Inst.C.E.

Under the Conditions of the Contract, no allowance will be made for any Water that may be found in the Tar.

Railway communication direct to the Works.

Tenders, endorsed "Tender for Tar," and addressed to the undersigned, must be delivered not later than Monday, June 25, 1906.

The Directors do not bind themselves to accept the highest or any Tender.

A. Canning Williams,
Secretary.

159, Friar Street,
Reading, June, 6, 1906.

COUNTY BOROUGH OF WARRINGTON.

THE Gas Committee invite Tenders for the under-mentioned GOODS—

1—Bags.
2—Bolts and Nuts.
3—Brass and Copper Tubing.
4—Brass Fittings.
5—Builders' Ironmongery.
6—Cast-Iron Pipes and Connections.
7—Cement.
8—Castings.
9—Clothing.
10—Copper Street-Lamps.
11—Cookers.
12—Common Paving and other Bricks.
13—Fire-Bricks, Fire-Clay, and Retorts.
14—Flexible Tube.
15—Glass.
16—Iron and Steel.
17—Lead and Compo. Pipe.
18—Lime.
19—Oils, Paint, &c.
20—Printing and Stationery.
21—Rails, Crossings, Fastens, &c.
22—Red and White Lead.
23—Setts.
24—Timber.
25—Wet and Dry Gas-Meters.
26—Wrought-Iron Tubes and Fittings.
27—Coal, Slack or Nuts, 30,000 Tons.
28—Cannel, 6000 Tons.
29—Benzol, 7000 Gallons.
30—Taps, Valves, &c.

Full Particulars can be obtained on application to Mr. W. S. Haddock, Gas Engineer, Warrington.

Tenders must be sent in not later than the 21st inst.

Fredk. Taylor,
Secretary.

Gas Offices, Warrington,
June 2, 1906.

BOROUGH OF CHORLEY.
(Gas Department.)

THE Corporation are prepared to receive TENDERS for the supply and delivery, at the Chorley Railway Station, of 1500 Yards of 4-inch diameter and 350 Yards of 6-inch diameter CAST-IRON MAIN PIPES.

Specification and Form of Tender can be obtained from Mr. J. W. Allin, Gas Engineer, Chorley.

Tenders, endorsed "Cast-Iron Pipes," to be sent to me not later than noon on Wednesday, the 20th inst.

The Corporation do not bind themselves to accept any Tender.

By order,
Jno. Mills,
Town Clerk.

Town Hall, Chorley,
June 2, 1906.

BOROUGH OF CHORLEY.
(Gas Department.)

THE Corporation of Chorley invite TENDERS for the purchase of surplus TAR during a period of Twelve Months from the 1st of July next.

Approximate quantity, 700 Tons.

Further Information may be obtained from Mr. J. W. Allin, Gas Manager, Water Street, Chorley.

Tenders, endorsed "Tar," to be sent to me on or before Tuesday, the 19th of June inst.

By order,
Jno. Mills,
Town Clerk.

Town Hall, Chorley,
June 7, 1906.

RHYL URBAN DISTRICT COUNCIL.

TENDERS FOR COAL.

THE Rhyl Urban District Council are prepared to receive TENDERS for the supply of 5000 Tons of Screened GAS COAL, to be delivered f.o.r. Rhyl during the Twelve Months ending July 31, 1907, in such quantities and at such times as may be required.

Form of Tender and Particulars of Conditions may be obtained on application to Mr. Leonard G. Hall, Assoc.M.Inst.C.E., Gas Engineer.

Sealed Tenders, endorsed "Tenders for Coal," to be delivered to me, the undersigned, not later than the 27th of June, 1906.

Approved security will be required.

The Council do not bind themselves to accept the lowest or any Tender.

Arthur Rowlands,
Clerk to the Council.

Council Offices, Clwyd Street,
Rhyl, June 2, 1906.

COUNTY BOROUGH OF BOLTON.
(Gas Department.)

TENDERS FOR COAL.

THE Gas and Lighting Committee in- vite TENDERS, from Colliery Proprietors only, for the supply of Screened and Unscreened GAS COAL, COBBLES, and NUTS required during the Year ending June 30, 1907.

Specifications and Forms of Tender may be obtained on application to Mr. Wm. Walsh, Office Superintendent, Gas Offices, Bolton.

Sealed Tenders, endorsed "Tender for Coal," and addressed to the Chairman of the above Committee, to be delivered at the Gas Offices, Bolton, not later than 9.30 a.m. on Friday, the 29th of June, 1906.

Samuel Parker,
Town Clerk.

Town Hall, Bolton,
June 5, 1906.

BOROUGH OF SAFFRON WALDEN.

TENDERS FOR COAL.

THE Gas and Water Undertaking Com- mittees of the Town Council are prepared to receive TENDERS for the supply of about 1600 Tons of best Screened GAS COAL, and about 250 Tons of best Hand-Picked Hard STEAM COAL respectively, for the Twelve Months ending the 30th of June, 1907.

Full Particulars can be obtained on application to Mr. A. H. Forbes, Borough Surveyor.

Sealed Tenders, endorsed "Tender for Gas Coal," or "Tender for Steam Coal," as the case may be, to be addressed and sent to me, the undersigned, not later than Five o'clock in the afternoon on Monday, the 25th day of June inst.

The lowest or any Tender will not necessarily be accepted.

W. Adams,
Town Clerk.

Saffron Walden,
June 6, 1906.

ROCHESTER, CHATHAM, AND STROOD GAS-LIGHT COMPANY.

TAR.

THE Directors are prepared to receive TENDERS for TAR to be produced at their Works at Rochester and Gillingham for One Year, commencing July the 1st next.

The quantity will be about 300,000 Gallons, and will include Carburetted Water-Gas Tar.

Further Particulars, with Form of Tender and Contract, may be had on application; and no Tender will be considered unless on the Form supplied by this Company.

Sealed Tenders, endorsed "Tar," must be delivered to me at these Offices not later than noon on Wednesday, June 20, 1906.

The Directors do not undertake to accept the highest or any Offer, and security for the due fulfilment of the Contract must be given if required.

J. M. Veevers,
Engineer and General Manager.

Gas Offices, Rochester,
June 7, 1906.

THE Borough of Longton Gas and Electricity Committee invite TENDERS for the purchase of the surplus TAR from the Gas-Works, Longton, during the Year ending the 30th of June, 1907.

Further Particulars may be obtained on application to the undersigned.

Tenders to be sent in endorsed "Tender for Tar," and addressed to the Chairman of the above Committee, on or before the 25th inst.

The Committee do not bind themselves to accept the highest or any Tender.

W. Langford,
Engineer and General Manager.

EXETER GASLIGHT AND COKE COMPANY.

OXIDE OF IRON.

TENDERS are invited for the supply of 150 Tons of OXIDE OF IRON Purifying Material delivered alongside Basin Gas-Works Wharf, c.i.f. The moisture not to exceed 35 per cent.

Also for the Purchase of 300 to 350 Tons of SPENT OXIDE delivered f.o.b. alongside Wharf.

The lowest or any Tender will not necessarily be accepted.

W. A. Padfield,
Engineer.

Gas Offices, Exeter,
June 7, 1906.

BRIDGEWATER COLLIERIES COKE-WORKS.
(The Earl of Ellesmere.)

TENDERS are invited for the Tar pro- duced at the above Works for a period of Six or Twelve Months from the 1st of July, 1906, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley Branch of the Lancashire and Yorkshire Railway; or at the Brackley Siding, Little Hulton Mineral Branch of the London and North-Western Railway.

The estimated quantity is about 2600 Tons per annum.

Tenders, endorsed "Tender for Tar," to be addressed to Mr. Thomas M. Brown, Bridgewater Coal Offices, 4, Chapel Walks, Manchester, not later than the 25th of June.

Manchester, May 29, 1906.

SAFFRON WALDEN UNION

TENDERS FOR COAL AND COKE.

THE Guardians of the above Union are prepared to receive TENDERS for the supply of about 250 Tons of Best Hand-Picked Hard STEAM COAL and 20 Tons of COKE for Twelve Months, to be delivered at the Saffron Walden Railway Station each month as required.

Sealed Tenders, endorsed "Tender for Coal," to be sent to me, the undersigned, not later than Monday, the 18th inst.

The lowest Tender will not necessarily be accepted.

By order,
Turner Collin,
Clerk.

Saffron Walden, June 6, 1906.

COLWYN BAY AND COLWYN URBAN DISTRICT COUNCIL.
(Gas Department.)

THE Gas Committee invite Tenders for the supply and delivery at Colwyn Bay Station of about 5500 Tons (more or less) of Best Screened GAS COAL during the Twelve Months ending June 30, 1907.

Sealed Tenders, endorsed "Tender for Gas Coal," to be addressed "Chairman of the Gas Committee," to be delivered at the Gas Offices, Colwyn Bay, not later than Wednesday, June 27.

The Committee do not bind themselves to accept the lowest or any Tender.

N.B.—No Tender Forms will be sent out.

Jas. C. Pennington,
Engineer and Manager.

Gas Offices, Colwyn Bay,
June 7, 1906.

LYMM URBAN DISTRICT COUNCIL.

TENDERS FOR CONDENSERS.

THE above Council are prepared to receive TENDERS for the supply and erection of CONDENSERS, with 9-inch Valves and Connections, suitable for dealing with 120,000 cubic feet per day.

For Particulars and Specification, apply to the Gas Manager, Mr. W. L. Donaldson.

Sealed Tenders, with detailed Drawings and Specification, to be delivered not later than Wednesday, the 20th of June inst., addressed to the undersigned, and endorsed "Tender for Condensers."

The Council do not bind themselves to accept the lowest or any Tender,

By order,
W. Mullard,
Clerk to the Council.

Council Offices, Lymm,
June 1, 1906.

CORPORATION OF LOUGHBOROUGH.
(Gas Department.)

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee invite Tenders for the surplus TAR and AMMONIACAL LIQUOR for Twelve Months, from July 1, 1906, to June 30, 1907.

Estimated amount of Tar 600 Tons; Liquor 1000 Tons.

The Contractor to state Price for Liquor at 5° Twaddel and per Ton extra for every ½° above 5°.

The Corporation to deliver both Tar and Liquor into Contractors' boats at the Derby Road Wharf, Loughborough.

Tenders, to be endorsed "Tenders for Tar and Liquor," and addressed and delivered to H. Perkins, Esq., Town Clerk, Town Hall, Loughborough, not later than the 23rd of June.

The Committee do not bind themselves to accept the highest or any Tender.

Edward Onions,
Engineer and Manager.

May 30, 1906.

CITY OF RIPON.

THE Gas Committee of the Corporation invite TENDERS for the RECONSTRUCTION of a TELESCOPIC GASHOLDER.

Drawings and Specifications and all Particulars can be obtained on application to the Engineer and Manager, at his Offices, Gas-Works, Ripon.

The Committee do not bind themselves to accept the lowest or any Tender.

Tenders to be sent into me on or before Tuesday, the 19th inst.

M. Kirkley,
Town Clerk.

Town Hall, Ripon,
June 8, 1906.

NEW MILLS URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL, &c.

THE New Mills Urban District Council invite TENDERS for the supply of 2500 Tons of best GAS COAL and 200 Tons of CANNEL for the Year ending the 30th of June, 1907.

Forms of Tender and full Particulars may be had on application to the Gas Manager.

TENDERS are also invited for the purchase of the surplus TAR and LIQUOR for One Year ending June 30, 1907.

Tenders, properly endorsed, to be sent to me the undersigned not later than June 25, 1906.

The Council do not bind themselves to accept the lowest or any Tender.

J. Pollitt,
Clerk.

Town Hall, New Mills,
June 6, 1906.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. Alfred Richards' Offices, 18, Finsbury Circus, E.C.

By order of the Directors of the
SOUTH SUBURBAN GAS COMPANY.

NEW ISSUE OF £5000 FIVE PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 26, at Two o'clock precisely, in Lots.

Particulars of the Auctioneer, 18, Finsbury Circus, E.C.

Re Mr. C. F. Wardell deceased and others.
STOCKS AND SHARES
IN THE
WOKING WATER AND GAS COMPANY,
BARNET DISTRICT GAS AND WATER COMPANY,
NORTHFLEET AND GREENHITHE GAS COMPANY, LIMITED,
ELSTREE AND BOREHAM WOOD GAS COMPANY, LIMITED.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 26, at Two o'clock, in Lots.

Particulars of the Auctioneer, 18, Finsbury Circus, E.C.

SLOUGH GAS AND COKE COMPANY.
Incorporated 1866.

ISSUE OF NEW ORDINARY SHARES UNDER THE SLOUGH GAS ORDER, 1901.

THE Directors Hereby Give Notice that they are prepared to receive TENDERS for 450 NEW ORDINARY SHARES of £10 each.

The Dividend paid on New Ordinary Shares for the past Half Year was £8 1s. per cent., the Additional Dividend beyond 7 per cent. being paid according to the Sliding Scale on reduction in price of Gas.

Holders of this issue of Shares will be entitled to Dividend as from the 31st of July, 1906.

The Shares will be allotted to the highest Tenders.

Tenders must be delivered at the Secretary's Office, 46A, High Street, Slough, on or before the 28th of June, 1906, accompanied by a deposit of £1 per Share, and the balance must be paid on or before the 31st of July, 1906.

Full Particulars and printed Forms of Tender can be obtained at the London and County Bank, Slough; of Messrs. R. H. Barrett and Son, Solicitors, Slough and Eton; and of the Secretary.

By order of the Directors,
Arthur Thomas,
Secretary.

46A, High Street, Slough,
Bucks, May 23, 1906.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of the Company, so far as they relate to DEBENTURE STOCK, WILL BE CLOSED at Ten o'clock in the forenoon on Friday, the 15th of June for the Half Year ending the 30th of June, 1906, and will be RE-OPENED on Friday, the 22nd of June.

The Interest for the Half Year will be payable on the 2nd day of July next, to the Proprietors registered on the closing of the Books.

By order of the Board,
James Randall,
Secretary.

Chief Offices: 639, High Road,
Tottenham, June 8, 1906.

HOLYHEAD AND NORTH WALES GAS AND WATER CORPORATION, LIMITED.

NOTICE is Hereby Given, that the TRANSFER BOOKS of the above Corporation WILL BE CLOSED from the 12th to the 22nd day of June, both days inclusive.

By order of the Directors,
R. T. STODDARD,
General Manager.

NOW READY, THE SECOND EDITION OF

GAS COMPANIES'

BOOK-KEEPING.

A Practical Treatise on the Keeping of Gas Companies' Accounts.

By
JOHN HENRY BREARLEY, and
BENJAMIN TAYLOR.

THE VOLUME CONTAINS TWO WORKS:
1—Gas Companies' Book-Keeping.
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Price Net: Complete, Cloth Bound, 12s. 6d.; Morocco Gilt, 18s.

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Gas Engineers' Agents and Contractors for
METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
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HEATHCOTE GAS COAL.
Rich in Illuminating Power and yield of Gas
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

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RETORTS CAREFULLY PACKED FOR SHIPMENT.

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CALORIMETER
for determining the calorific value of gases
IS MADE BY
JOHN J. GRIFFIN & SONS,
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MIRFIELD GAS COAL
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.
Please apply for Prices, Analyses, and Reports, to the
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LONDON: 22, Park Village East, N.W.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
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Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
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ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works (also large Stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

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AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
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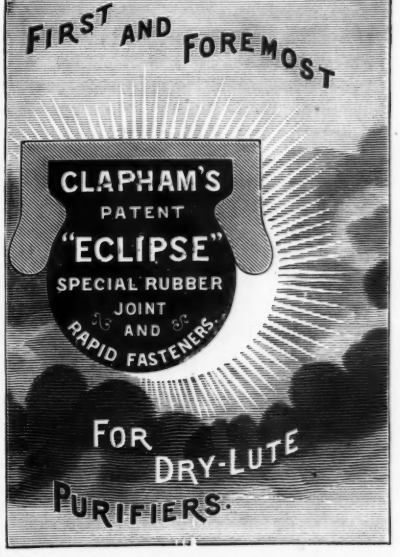
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.



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The record in Gas Light efficiency was set Five Years' ago by the Lucas Light, and it has been maintained ever since. The principle of the Lucas Lamp is the simplest of any high-power light: the directest road to good results. The light is unique in its quality, due to the preservation of heat in the enclosed cylinder and the high percentage of air in the mixture. MOFFAT'S LTD., 155, FARRINGDON ROAD, LONDON, E.C.

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JÄGER GRIDS and the Jäger System of Purification for obtaining the greatest efficiency from Purifiers. **Reduced Speed. Reduced Pressure. Long Time Contact. Horizontal Flow of Gas.**

MORRIS GRIDS for use in conjunction with Jäger Conduits and Distributing Chambers.

VERTICAL GRIDS Jäger System without Conduits for partial relief of overtaxed Purifiers retaining Vertical Flow of Gas.

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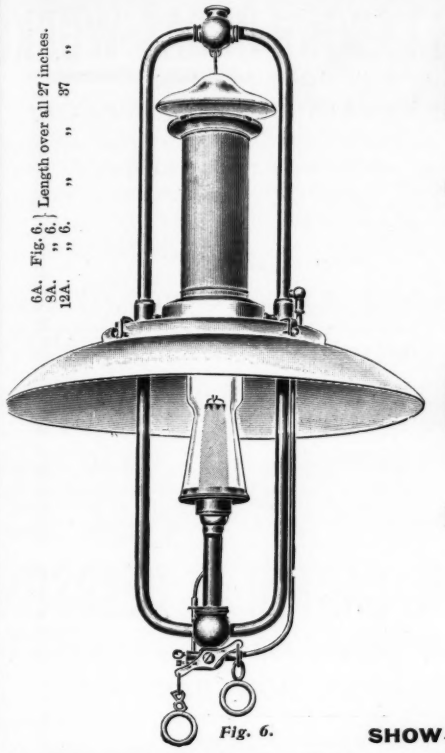

Fig. 6.

A. E. PODMORE & CO.

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BURNER

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Laundries, Retort-Houses, Foundries, Flour Mills, and Business Premises generally, &c.

Size 6A. Fig. 6. Size 8A. Fig. 6. Size 12A. Fig. 6.

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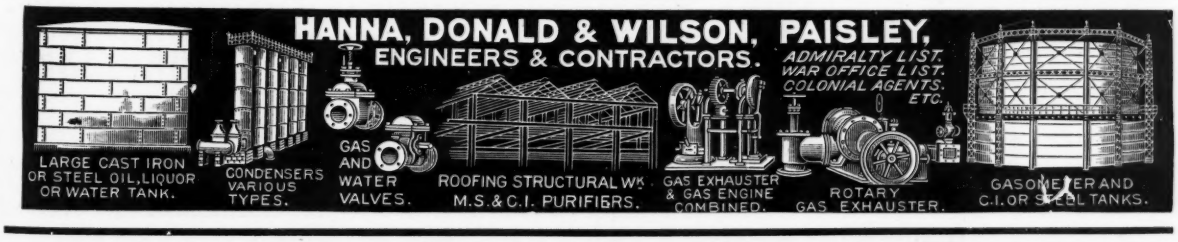
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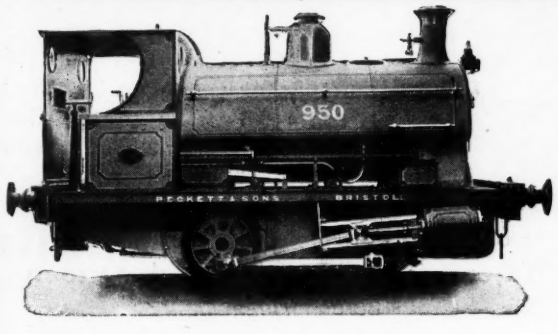

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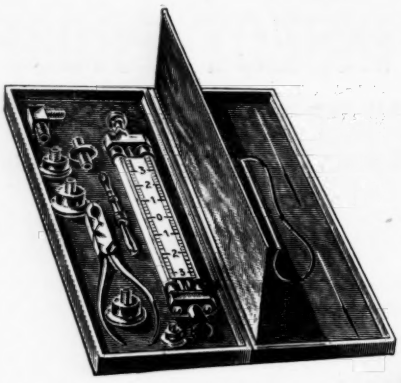

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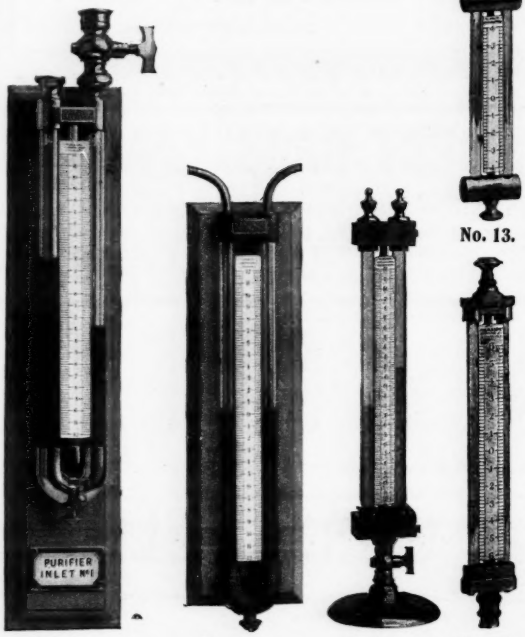

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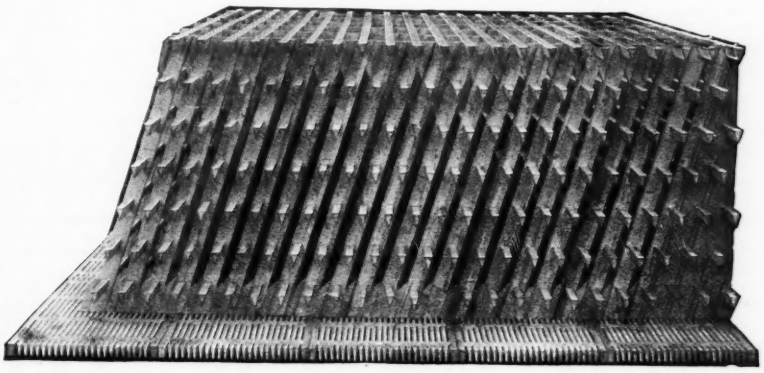

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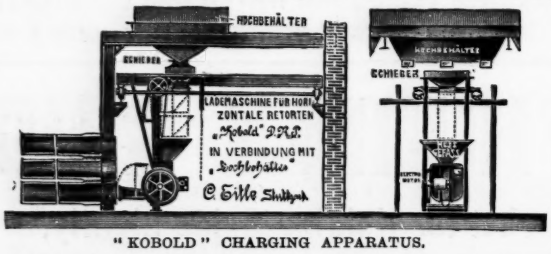

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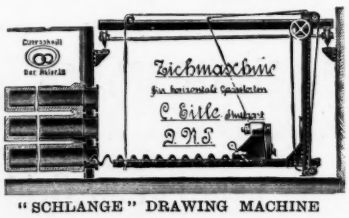

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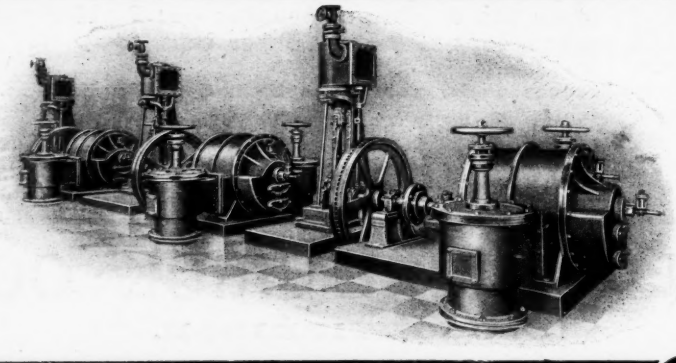

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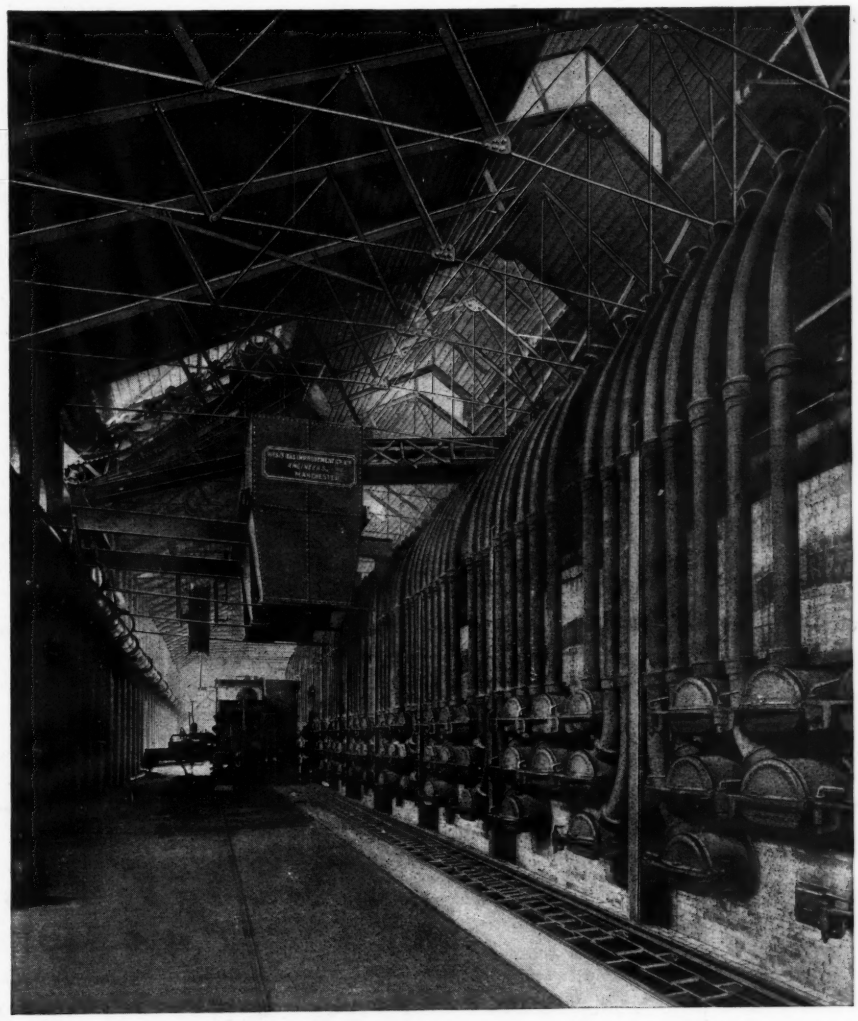

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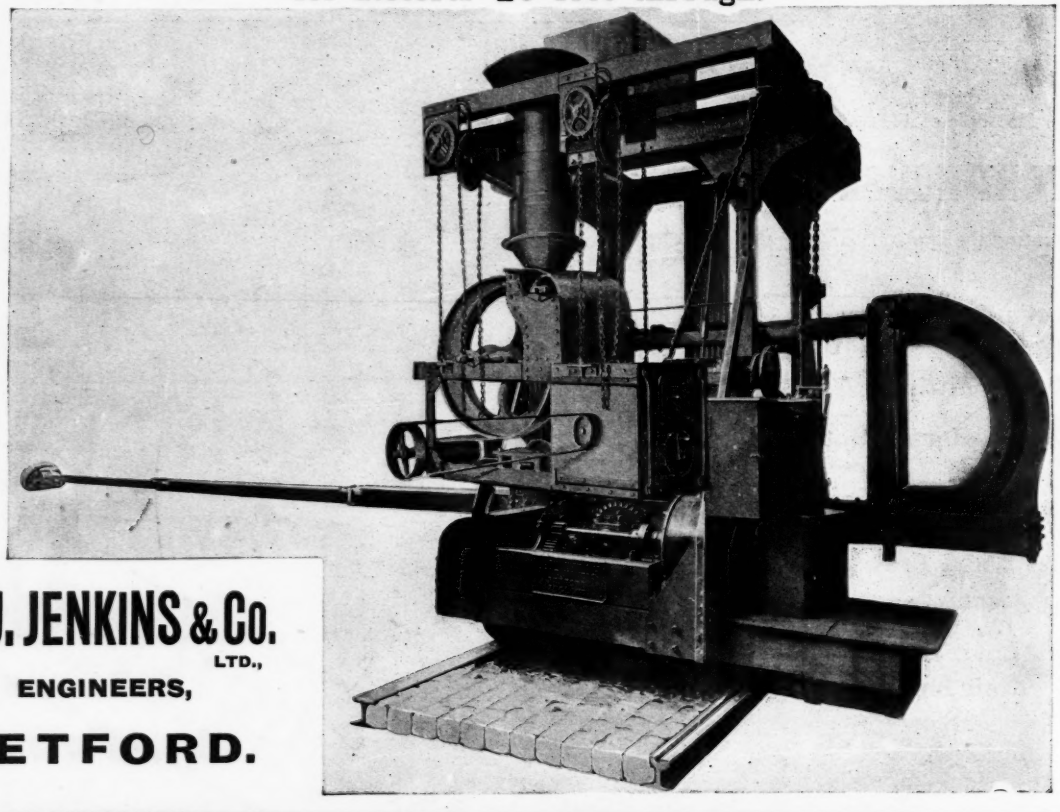

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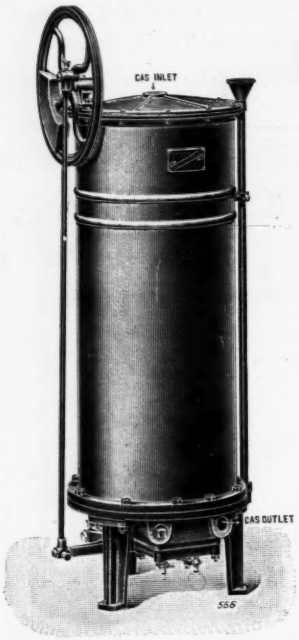

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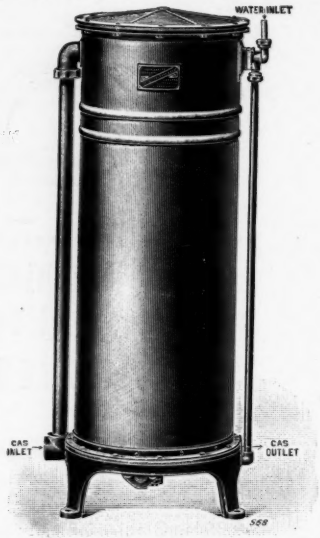

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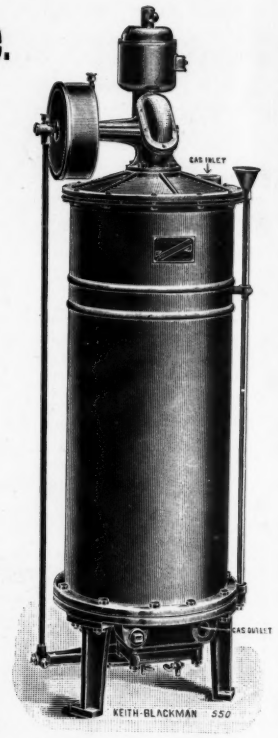

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